

Exhibit G

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND DIVISION

IN RE APPLE IPHONE ANTITRUST LITIGATION

Civil Action No. 4:11-cv-06714-YGR

DONALD R. CAMERON, et al.

Civil Action No. 4:19-cv-03074-YGR

v.
Plaintiffs,

APPLE INC.,

Defendant,

EXPERT REPORT AND DECLARATION OF JAMES E. MALACKOWSKI

August 10, 2021

CONFIDENTIAL DOCUMENT
Lodged Pursuant to Local Rule 79-5(c)-(d)

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1. FIRM BACKGROUND AND QUALIFICATIONS

1. I am the Chief Executive Officer of Ocean Tomo, LLC, (“Ocean Tomo”) the Intellectual Capital Merchant Banc™ firm providing financial expert, management consulting, and investment banking services related to intellectual property (“IP”) and other intangible assets; corporate accounting investigations; regulatory and reporting obligations; solvency and restructuring; and contractual or competition disputes. Ocean Tomo assists clients – corporations, law firms, governments and institutional investors – in realizing Intellectual Capital Equity® value broadly defined. Subsidiaries of Ocean Tomo include Ocean Tomo Investments Group, LLC, a registered broker dealer.
2. I am a Registered Certified Public Accountant in the State of Illinois, Certified in Financial Forensics. I have been a member of the American Institute of Certified Public Accountants (“AICPA”) since 1985, among other accounting associations. I frequently testify in matters involving the analysis of complex financial and accounting records, often in the context of intellectual property litigation. Such matters have included analysis of product line, divisional, and consolidated financial statements. On numerous occasions I have addressed profit accounting measures including determinations of gross profit, operating profit, net profit, and EBITDA (Earnings Before Interest Taxes Depreciation and Amortization). I have been qualified to provide expert testimony on cost variability and cost allocations.
3. In my role as a Principal, Advisor or Director, I have had the responsibility to review and approve company and institutional financial statements and tax filings and have participated in numerous accounting audits.
4. I am a founding and continuous member of the IP Hall of Fame Academy. I have been recognized annually since 2007 by leading industry publications as one of the “World’s Leading IP Strategists.” Significantly, I was listed among “50 Under 45” by IP Law & Business™; included in the National Law Journal’s inaugural list of 50 Intellectual Property Trailblazers & Pioneers; and, named as one of “The Most Influential People in IP” by Managing Intellectual Property™. I was named as 1 of 50 individuals, companies, and institutions that framed the first 50 issues of *LAM Magazine* as well as 1 of 60 leading global Economics Expert Witnesses by the same publication in 2014. In 2011, I was selected by the World Economic Forum as 1 of less than 20 members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013, I was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration.

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5. On more than fifty occasions, I have served as an expert in U.S. Federal Court, U.S. Bankruptcy Court, state court and the Ontario Superior Court of Justice on questions relating to intellectual property economics, including the subject of valuation, reasonable royalty, lost profits, price erosion, commercial success, corrective advertising, creditor allocations, Hatch Waxman Act market exclusivity, business significance of licensing terms including reasonable and non-discriminatory (“RAND”) obligations, and the equities of a potential injunction. My experience extends to matters of general business valuation and commercial disputes, both foreign and domestic. I have publicly addressed policy issues affecting international trade and have provided expert opinions concerning antidumping and countervailing duties imposed by the U.S. Department of Commerce, as well as testimony before the International Trade Commission.

6. I have been a member of the Licensing Executives Society (“LES”) since 1988, including serving as a Past President of The Licensing Executives Society International, Inc. as well as its largest chapter, LES USA & Canada, Inc. In 2018, I joined the Standards Development Organization Board of the Licensing Executives Society (USA & Canada), Inc., governing voluntary consensus-based professional practices that are guided in their development by the American National Standards Institute’s (ANSI’s) Essential Requirements. LES is the premiere global professional association of technology transfer and intellectual asset management professionals with more than 8,000 members in more than 32 countries. LES standards are designed to encourage and teach consensus practices in many of the business process aspects of intellectual capital management.

7. In 2007, I was the Founding Chair of the Board of Governors for what is now Certified Licensing Professionals, Inc., administrator of the Certified Licensing Professional (“CLP”) program for professionals in the fields of licensing, business development, and commercialization of intellectual property. CLP’s mission is to elevate the licensing profession through knowledge and standards. I am one of more than 1,000 professionals holding a CLP certification.

8. I have substantial experience as a board director for leading technology corporations and research organizations as well as companies with critical brand management issues. I was a Director for Ford Global Technologies, Inc. (“FGTI”), an affiliate of Ford Motor Company. In my role, I advised Ford Motor Company on the original business strategy that led to the formation of FGTI, which was then the largest known technology management company in the United States.

9. I am the Founder of the Center for Applied Innovation (“CAI”), a Chicago based not-for-profit with both local and international programs. CAI was created to manage education, public

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policy outreach and related economic activity around applied technology and intellectual property rights in the State of Illinois and around the world. CAI created and patented the first commoditized contract for technology licensing, the Unit License Right™ (“ULR”). I am also the founder of the Chicago-based Intellectual Property Exchange International (“IPXI”), a former financial exchange that facilitated the non-exclusive licensing and trading of intellectual property rights. The ULR innovation was licensed to IPXI but is now being developed as a blockchain model through ipcoingroup.com.

10. Today, I focus my not-for-profit efforts with organizations leveraging science and innovation for the benefit of children, including those located in lesser developed countries. I am an advisory board member of University of Chicago’s Pritzker School of Molecular Engineering and have served since 2002 as a Trustee or Director of the National Inventors Hall of Fame, Inc., an organization providing summer enrichment programs for more than 200,000 students annually. For more than ten years, I served as a Director of Chicago’s Stanley Manne Children’s Research Institute, advancing the organization’s agenda to measure, and report the impact of its pediatric research.

11. I am a frequent speaker on emerging technology markets and related financial measures. I have addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CNBC Worldwide Exchange, CBS News Radio, and Fox Business National Television as well as other recognized news-based internet video channels. I am a judge on behalf of the Illinois Technology Association’s CityLIGHTSTM Innovation Awards program, the University of Notre Dame McCloskey Venture Competition, 1st Source Faculty Commercialization Awards, and have also appeared as a judge on PBS’s *Everyday Edisons*.

12. As an inventor, I have more than twenty issued U.S. patents. I am a frequent instructor for graduate studies on intellectual property management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy.

13. Throughout my career, I have taught, written, lectured, and testified extensively on topics related to intellectual property, including intellectual property licensing, as reflected in my curriculum vitae in Appendix A.

14. Ocean Tomo is presently being compensated for my work in this matter at a rate of \$950 per hour. Other Ocean Tomo consultants are assisting me in this engagement and are being

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compensated at various rates under \$950 per hour. The Ocean Tomo team working under my direction includes Greg Campanella, Drew Sills, Noor Al-Banna, Daniel Fang, Andrew Goldstein, Chris Stearns, Daniel Lin, and Vincent Damron. No part of Ocean Tomo's compensation depends on the outcome of this litigation.

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2. ASSIGNMENT

15. This declaration is designated as containing Highly Confidential – Attorneys’ Eyes Only information under the Protective Orders issued in this matter¹ as specified in the footer on each page. This declaration is to be used only for the purpose of this litigation. No part of this declaration may be published or used for any other purpose without written consent. I make this declaration in support of Apple’s Opposition to Developer Plaintiffs’ Motion for Class Certification; Apple’s Opposition to Consumer Plaintiffs’ Motion for Class Certification; Apple’s Motion to Exclude the Testimony of Einer Elhauge, Nicholas Economides, and Christian Tregillis; and Apple’s Motion to Exclude the Testimony of Daniel McFadden.

16. Ocean Tomo was retained by counsel for Apple, Inc. (“Apple” or the “Company”) to address various questions regarding Apple’s App Store and iOS, including to provide an overview of Apple’s intellectual property assets, particularly those associated with iOS and the App Store, as well as software and tools that Apple licenses to app developers, together with Apple’s investment in and protection of those intellectual property assets. I was not asked to, and did not, prepare a comprehensive inventory of such assets, nor have I conducted a financial valuation of those assets.

17. I have also been asked to analyze and respond to certain opinions and analyses provided on behalf of the Plaintiffs in the reports of Dr. Economides², Mr. Elhauge³, Mr. Tregillis⁴, and Dr. McFadden⁵ submitted in support of their motions for class certification. Specifically, I have been asked to analyze if and how the experts address Apple’s IP in their reports, the experts’ suggested alternatives in the but-for world, and their characterizations of App Store profitability.

¹ Stipulation Between Epic Games, Inc. and Apple Inc. and Amended Protective Order, January 21, 2021. Stipulated Amended Protective Order, January 21, 2021.

² Expert Report of Dr. Nicholas Economides, June 1, 2021.

³ Expert Report of Professor Einer Elhauge, June 1, 2021.

⁴ Expert Report of Christian Tregillis, June 1, 2021.

⁵ Expert Report of Daniel McFadden, June 1, 2021.

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3. EXECUTIVE SUMMARY OF OPINIONS AND ANALYSES

18. My opinions and analyses in this matter are provided for use by the Court in identifying and evaluating the connection between Apple's intellectual property rights and the acts and conduct by Apple that are alleged to be unlawful in this litigation, as well as the remedies that the Plaintiffs have indicated they intend to seek if they prevail on their claims. My opinions are also provided for use by the Court in evaluating the characterizations of App Store profitability offered by Plaintiffs' experts.

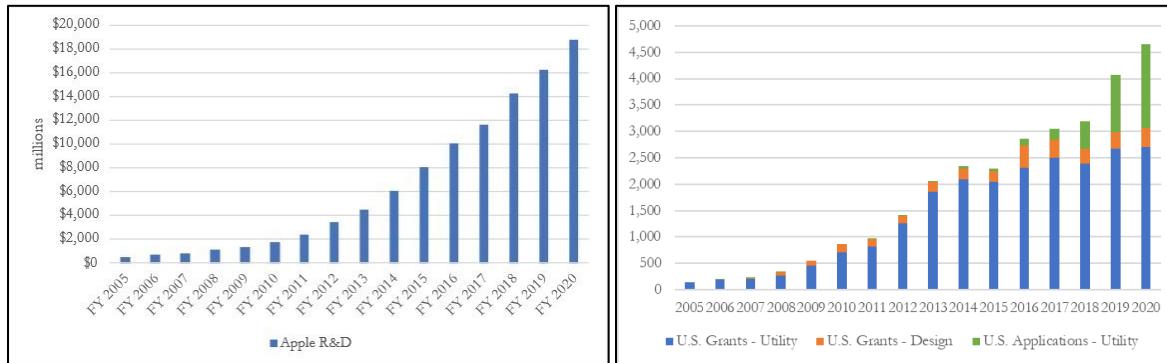
3.1. Executive Summary of Opinions

19. **Opinion 1.1** – Apple has valuable IP in its iOS ecosystem. Apple has made a substantial investment in research and development resulting in a significant IP portfolio. From Apple's fiscal year ("FY") 2005, when Apple's efforts to invent its iPhone technology began in earnest, through its FY 2020, Apple invested over \$100 billion in research and development, including aspects of its technology ranging from software and hardware to services and accessories. Apple's investment in research and development has, in part, resulted in a continuously growing portfolio of IP assets, including patents, trademarks, copyrights, and trade secrets that protect its technology, tools, products, and software. Apple's U.S. patent grant and application counts grew substantially over the same FY 2005 to FY 2020 period, and the Company currently has over 27,000 U.S. patents and approximately 3,800 additional U.S. utility patent applications. Apple owns over 5,000 registered U.S. copyrights. Apple has an extensive portfolio of registered trademarks in the U.S., and has obtained service marks, trade names, and trade dress as protection of its rights in these valuable assets. Apple also maintains trade secrets. See Sections 8.1 and 8.2 pp. 50-64.

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Figure 1: Apple R&D Expenditures and Patent Grants 2005 – 2020⁶



20. **Opinion 1.2** – Many of Apple’s IP assets relate to technologies applicable to iOS and the App Store, development tools, and other related technology, including more than 1,184 U.S. patents and applications relating to specific development tools, application programming interfaces (“APIs”) in frameworks and related services, and other technology used by app developers in developing iOS apps. The App Store itself is referenced in more than 250 U.S. patents and applications.⁷ Apple has more than 200 registered copyrights that include the term iOS, as well as trademarks of the term App Store®, developer tools such as CloudKit® and Swift®, and slogans used to promote the App Store such as “There’s an app for that”®.⁸ See Section 8.4.2, pp. 76-80.

21. **Opinion 1.3** – Apple’s IP rights are integral to the development, testing, and distribution of apps for the iOS ecosystem. Apple provides app developers an extensive library of developer documentation and code, including tutorials, sample code, articles, and APIs, that are protected by Apple IP, including patents, copyrights, trademarks, and trade secrets. As the named Plaintiffs have acknowledged, a developer uses Apple’s IP to develop and distribute apps for the iOS ecosystem. Past examples of developer use of Apple’s IP include Activision’s use of the multi-touch API to develop *Guitar Hero*, Sega’s use of the accelerometer API technology to enable physical tilt controls for *Super Monkey Ball*, and Epic Games’ use of the Metal framework, which “revolutionized graphics

⁶ Schedule 6.0; Schedule 1.1; Schedule 1.2; Schedule 1.3.

⁷ Innography Patent Database, accessed February 2021.

⁸ Schedule 2.0.

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on iOS” and allowed developers to “create richer 3D worlds.”⁹ See Sections 7.4 and 8.4, pp. 36-49, 66-80.

22. **Opinion 1.4 –** Apple’s IP rights are generally exclusive rights. An IP owner’s exclusive right in its intellectual property originates from the U.S. Constitution and has been codified by Congress and, in some instances, in state law. Through its ownership and control of its intellectual property, Apple holds the exclusive right to determine if and when its protected technology may be used, including the right to choose to license – or not license – its protected technology according to monetary and non-monetary terms of its own choosing. See Section 6.2, pp. 16-19.

23. **Opinion 1.5 –** Through the Apple Developer Program, Apple currently grants app developers limited licenses to the Apple IP they practice or use in developing, testing, and distributing their iOS apps, in addition to a variety of additional rights and services. These licenses grant app developers access to a broad array of software and other technology that Apple develops and continues to improve, including APIs, software development kits (“SDKs”), and other software. As explained by current Apple Fellow and former Senior Vice President, Worldwide Marketing Philip Schiller, Apple APIs are provided “for virtually every task a developer might wish to implement with software or hardware.”¹⁰ Apple provides APIs, software, and support for a vast variety of tasks that developers wish to implement, and the number of APIs provided to developers has increased exponentially from around 10,000 in 2008 to 150,000 today.¹¹ See Section 7.4, pp. 36-49.

24. **Opinion 2.1 –** iOS developers use Apple’s IP in unique combinations and implementations. Based on the specific functionality requirements of applications in each of the twenty-seven App Store categories, as well as individual developers’ specific technological needs and elections within each of those categories, iOS developers rely on highly varied and unique bundles of Apple intellectual property provided under Apple’s Developer Program. This IP disparity is illustrated by an analysis of exemplary identifiable IP assets related to certain Apple-provided technologies. For instance, I’ve identified 19 Apple patents specifically related to three Apple frameworks relevant to

⁹ “Apple WWDC 2015,” *YouTube*, June 15, 2015, at 18:35, 19:57, https://www.youtube.com/watch?v=_p8AsQhaVKI.

¹⁰ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, pp. 1, 6.

¹¹ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,894:15-22, 2,895:6-14.

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game development (Metal, GameKit, ReplayKit), distinct from 44 identified Apple patents relevant to Music applications (CoreAudio, AudioToolBox). See Section 8.5, pp. 81-84.

25. **Opinion 2.2** – Similarly, members of the proposed consumer class have application preferences, usage patterns, and purchasing habits that vary on an individual by individual basis, and accordingly practice, rely upon, and benefit from unique and widely varied subsets of Apple’s extensive intellectual property portfolio. See Section 8.6, pp. 84-85.

26. **Opinion 3.1** – The analyses performed by the Plaintiffs’ experts, and as a result their conclusions, are flawed because they ignore Apple’s IP and its necessary use in native iOS applications created by developers and used by consumers. See Section 9, pp. 86-96.

27. **Opinion 3.2** – The proposals laid out by the Plaintiffs’ experts in the but-for world completely ignore Apple’s IP and services and are therefore unrealistic. Plaintiff’s but-for world assumes that Apple would disseminate its IP with little to no control over licensing or compensation. Such behavior would be counterproductive and would make Apple an outlier in the field of IP development and licensing. Indeed, the but-for world imagined by the Plaintiff’s experts essentially assumes competitive platforms will have the right to free ride on Apple’s investment in proprietary IP. See Section 10.1, pp. 97-102.

28. **Opinion 3.3** – Consumers and developers would be affected individually and uniquely by Plaintiffs’ experts’ proposed remedies. The Plaintiffs’ experts base their analyses on flawed assumptions that Plaintiffs’ proposed remedies would allow Apple to maintain the current Developer Program annual fee structure in a but-for world. Further, they mischaracterize the current \$99 fee as complete compensation for the IP rights and services provided by Apple under the program. In reality, Apple’s App Store, comprised of 1.8 million apps,¹² is part of a broader iOS ecosystem in which, pursuant to licenses from Apple, developers take advantage of varying revenue models and consumers receive various Apple-IP-protected benefits: certain app developers sell apps, while others distribute apps for free and sell IAP, and while still others distribute apps for free and monetize their apps in ad-based revenue models, if at all. Regardless of revenue model, developers currently benefit from unrestricted access to a library of Apple IP. But Apple need not maintain the same Developer Program fee structure in a proposed but-for world that does not maintain the same Developer Program app distribution structure. There are innumerable fee structure options Apple

¹² “App Store,” Apple, <https://www.apple.com/app-store/>, accessed on August 5, 2021.

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could utilize in light of IP licensing practices generally and specific structures already practiced in the software and application development industries. See Sections 10.2 and 10.3, pp. 102-110.

29. **Opinion 3.4** – In view of the variety of potential Developer Program fee structure changes in the but-for world, and the diversity of the particular Apple IP on which each proposed class member and non-member relies, the but-for world is unlikely to have a common outcome for developers nor consumers. Instead, each individual developer and individual consumer would be affected differently by a transition to a but-for world. Given the unique characteristics of each developer and consumer, some would be advantaged by the change, others disadvantaged, and others relatively unaffected. Further, a developer or consumer’s status as a “winner,” “loser,” or relatively unaffected party in the but-for world is unrelated to membership or non-membership in the proposed classes. See Sections 10.2 and 10.3, pp. 102-110.

30. **Opinion 4.1** – Apple, as a publicly traded company, provides quarterly and annual audited financial statements in a standardized format compliant with Generally Accepted Accounting Principles (“GAAP”). The reporting segmentation of these financial statements adhere to the Management Approach within GAAP, meaning they align with how management views and makes decisions about the business. Apple manages its business as an interrelated ecosystem of products and services, Apple’s GAAP reporting segments are based on geography rather than business line. Apple does not allocate joint R&D and corporate expenses to and among its identified reporting segments because it does not view those expenses on an allocated basis in managing the business; and if joint costs are not and cannot be allocated at the segment level, those costs cannot be meaningfully allocated at the category level of operations, or more specifically, to the App Store.¹³ See Section 11, pp. 111-135.

31. **Opinion 4.2** – Plaintiff’s experts’ profitability analyses are flawed and inconsistent with Apple’s financial reporting practices. Their estimates (1) ignore Generally Accepted Accounting Principles, (2) mischaracterize the level at which Apple collects and reports its financial performance, and (3) rely on economically arbitrary methods to allocate inseparable joint costs. See Section 11, pp. 111-135.

¹³ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

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3.2. Bases for Opinions and Analyses

32. The bases for my opinions and analyses are discussed within the body of my declaration and are further supported by the schedules attached as Appendix C. The opinions and analyses discussed throughout this declaration are based on my current understanding of the facts and circumstances surrounding this matter, my review of certain produced documentation, testimony, and third-party information available to date, and my experience and training. The opinions and analyses described in my declaration are subject to change based upon additional discovery or other developments. If additional information becomes available in this matter, I plan to review the information and prepare a supplemental report, if appropriate and allowed by the Court. If an expert provides analysis or offers opinions regarding the subject of my declaration and/or opinions in this matter, or a fact witness provides evidence regarding issues I have addressed in this matter, I will review those analyses and opinions and prepare a rebuttal or response, as and if appropriate. If requested to provide testimony at trial in this matter, in addition to evidence cited in this declaration, I may rely on deposition or trial testimony and/or demonstrative exhibits that illustrate the concepts and conclusions contained in this declaration.

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4. SUMMARY OF INFORMATION CONSIDERED

33. A detailed listing of documents I have considered to date in connection with this litigation is attached as Appendix B. In general, prior to issuance of this declaration, I reviewed the following:

- Legal filings and proceedings in this matter and other litigations involving Apple;
- Trial transcript of *Epic Games v. Apple*, 20-cv-05640-YGR(N.D. Cal.);
- Produced documents;
- Applicable case law;
- Applicable Intellectual Property law;
- Deposition testimony, trial testimony, and declarations by Apple employees:
 - Eddy Cue, Senior Vice President of Internet Services and Software, Deposition, February 8, 2021;
 - Mark Rollins, Finance Manager, Deposition, February 11, 2021;
 - Philip Schiller, current Apple Fellow and former Senior Vice President, Worldwide Marketing, Declaration, September 15, 2020, Deposition, February 11, 2021, and Trial Testimony, May 17, 2021;
 - Timothy Cook, Chief Executive Officer, Deposition, February 12, 2021, and Trial Testimony, May 21, 2021;
 - Matthew Fischer, Vice President, App Store, Trial Testimony, May 6, 2021;
- Trial testimony by Epic Games employees:
 - Andrew Grant, Technical Director, Trial Testimony, May 5, 2021;
- Deposition testimony by Named Developer Plaintiffs:
 - Richard Czeslawski, Deposition, June 17, 2021;
 - Donald Cameron, Deposition, June 25, 2021;
- Expert reports and deposition testimony of the following individuals:
 - Dr. Nicholas Economides, Report, June 1, 2021, and Deposition, August 4, 2021;
 - Professor Einer Elhauge, Report, June 1, 2021, and Deposition, July 30, 2021;

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- Christian Tregillis, Report, June 1, 2021, and Deposition, August 2, 2021;
- Daniel McFadden, Report, June 1, 2021, and Deposition, August 3, 2021;
- Lorin Hitt, Report, August 10, 2021; and
- Publicly available information.

34. References to documents and testimony in this declaration are meant to provide examples of supporting information but are not intended to be a comprehensive or exhaustive list of all known support.

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5. RELEVANT ENTITIES & PROPOSED CLASSES

5.1. Proposed Classes

35. Donald R. Cameron and Pure Sweat Basketball, Inc. (the “Named Developer Plaintiffs”) are U.S. members of the iOS app developer community. The Named Developer Plaintiffs have moved to certify the following proposed class:

All U.S. developers of any Apple iOS application or in-app product (including subscriptions) sold for a non-zero price via Apple’s iOS App Store at any time on or after June 4, 2015.¹⁴

36. For the remainder of my declaration, I will refer to the Named Developer Plaintiffs and the proposed developer class collectively as the “Developer Plaintiffs.” Members of the proposed developer class exhibit a wide range of behaviors and business practices on the App Store, including: development across dozens of app genres and categories, pursuit of a variety of monetization models (e.g., subscription, paid download, and myriad in-app purchase structures), selection of price points ranging from about \$1 to nearly \$1,000, and distribution of apps either exclusively on iOS or across multiple platforms. Further, the developers themselves range from corporate titans (e.g., Google, Microsoft, Amazon) with billions in app revenues to individual student hobbyists with a few app transactions.

37. Robert Pepper, Stephen H. Schwartz, Edward W. Hayter, and Edward Lawrence (the “Named Consumer Plaintiffs”) are iOS app consumers. The Named Consumer Plaintiffs have moved to certify the following proposed class:

All persons in the United States, exclusive of Apple and its employees, agents and affiliates, and the Court and its employees, who purchased one or more iOS applications or application licenses from Defendant Apple Inc. (“Apple”), or who paid Apple for one or more in-app purchases, including, but not limited to, any subscription purchase, for use on an iOS Device at any time since July 10, 2008 (the “Class Period”).¹⁵

38. For the remainder of my declaration, I will refer to the Named Consumer Plaintiffs and the proposed consumer class collectively as the “Consumer Plaintiffs.”

¹⁴ Developer Plaintiffs’ Motion for Class Certification, p. 1.

¹⁵ Plaintiffs’ Notice of Motion and Motion for class Certification; Memorandum of Points and Authorities, p. 1.

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39. Further, I will refer to Consumer Plaintiffs and Developer Plaintiffs collectively as the “Plaintiffs.”

5.2. Apple

40. Apple was established in 1977.¹⁶ Apple’s principal executive offices are located in Cupertino, California.¹⁷ Apple “designs, manufactures and markets smartphones, personal computers, tablets, wearables and accessories, and sells a variety of related services.”¹⁸ Apple hardware products include the iPhone, Mac, iPad, and wearables, home devices, and accessories, such as AirPods, Apple TV, Apple Watch, Beats products, and HomePod.¹⁹ Apple also offers digital content and services, such as the App Store, AppleCare, cloud services, Apple Music, Apple TV+, Apple Card, and Apple Pay.²⁰

¹⁶ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 1.

¹⁷ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, cover.

¹⁸ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 1.

¹⁹ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 1.

²⁰ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, pp. 1-2.

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6. INTELLECTUAL PROPERTY BACKGROUND

6.1. Value of Intellectual Property to Economy

41. The United States Patent and Trademark Office (“USPTO” or “PTO”) has summarized intellectual property:

Patents, trademarks, and copyrights are the principal means for establishing ownership rights to inventions as well as ideas and provide a legal foundation by which intangible ideas and creations generate tangible benefits to businesses and employees.

Intellectual property (IP) protection affects commerce throughout the economy by: providing incentives to invent and create; protecting innovators from unauthorized copying; facilitating vertical specialization in technology markets; creating a platform for financial investments innovation; supporting startup liquidity and growth through mergers, acquisitions, and IPOs; making licensing-based technology models possible; and enabling a more efficient market for technology transfer and trading in technology and ideas.²¹

42. The USPTO observed that, “[i]nnovation and creative endeavors are indispensable elements that drive economic growth and sustain the competitive edge of the U.S. economy.”²² “A growing number of U.S. and international studies demonstrate the important role of IP in economic activity.”²³

6.2. Intellectual Property Provides the Right to Exclude Use by Others

43. “IP incentivizes the creation of new goods and services by conferring exclusive rights to their creators.”²⁴ This originates from the U.S. Constitution; Article 1, Section 8, Clause 8 of the

²¹ “Intellectual Property and the U.S. Economy,” USPTO, September 26, 2016, <https://www.uspto.gov/learning-and-resources/ip-motion/intellectual-property-and-us-economy>.

²² “Intellectual Property and the U.S. Economy: 2016 Update,” *Economics & Statistics Administration and the U.S. Patent and Trademark Office*, September 2016, <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>, p. 1.

²³ “Intellectual Property and the U.S. Economy: 2016 Update,” *Economics & Statistics Administration and the U.S. Patent and Trademark Office*, September 2016, <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>, p. 1.

²⁴ “Intellectual Property and the U.S. Economy: 2016 Update,” *Economics & Statistics Administration and the U.S. Patent and Trademark Office*, September 2016, <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>, p. 1.

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Constitution grants Congress the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”²⁵ Congress set forth the exclusivity of a patent owner’s rights in the definition of patent infringement as stated in 35 U.S.C. § 271(a):

Except as otherwise provided in this title, whoever without authorization makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.²⁶

44. The IP owner’s exclusive rights to trademarks, copyrights and trade secrets are also protected and delineated by U.S. code; state law and common law provide additional protections.²⁷ IP rights can spur “competitive innovations,” increase output, and “improv[e] the quality of the services.”²⁸ IP rights can incentivize and protect an IP rights owner in: maintaining or improving the quality of their product or service;²⁹ ensuring consumer safety or improving product security and privacy;³⁰ improving the ease with which consumers can use a service;³¹ and preventing free riding.³² IP rights also may reduce legal exposure and/or interactions with a litigious counterparty.³³

45. In a joint report, the Federal Trade Commission and the United States Department of Justice, Antitrust Division observed:

²⁵ U.S. Constitution, Art. 1, Sect. 8, Cl. 8.

²⁶ 35 U.S.C. § 271(a).

²⁷ 35 U.S.C. § 100 et seq. (patents); 17 U.S.C. § 101 et seq. (copyrights); 15 U.S.C. § 1051 et seq. (trademarks); Unif. Trade Secrets Act; 18 U.S.C. § 1836 et seq. (“Defend Trade Secrets Act of 2016”); 18 U.S.C. § 1831 et seq. (“Economic Espionage Act of 1996”); Cal. Civ. Code § 3426 et seq. (California “Uniform Trade Secrets Act”); *Stromback v. New Line Cinema*, 384 F.3d 283 (6th Cir. 2004).

²⁸ *Ohio et al. v. American Express Co. et al.*, 138 S. Ct. at 2274 (2018).

²⁹ *California Computer Products, Inc. v. International Business Machines Corp.*, 613 F.2d 727, 744 (9th Cir. 1979); *Data General Corp. v. Grumman Systems Support Corp.*, 36 F.3d 1147, 1183 (1st Cir. 1994); *Image Technical Services, Inc. v. Eastman Kodak Co.*, 125 F.3d 1195, 1220 n.12 (9th Cir. 1997); *HDC Medical, Inc. v. Minntech Corp.*, 474 F.3d 543, 550 (8th Cir. 2007).

³⁰ *Continental T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 55 n.23 (S. Ct. 1977); *Apple iPod iTunes Antitrust Litigation*, Case No. 05-CV-0037 YGR, 2014 WL 4809288 (N.D. Cal. 2014).

³¹ *In re Payment Card Interchange Fee & Merchant Discount Antitrust Litigation*, 986 F. Supp. 2d 207, 228 (E.D.N.Y. 2013), rev’d on other grounds, 827 F.3d 223 (2d Cir. 2016).

³² *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451, 461 (S. Ct. 1992); *Gorlick Distribution Centers, LLC v. Car Sound Exhaust System, Inc. et al.*, 723 F.3d 1019, 1026 (9th Cir. 2013).

³³ *Technical Resource Services, Inc. v. Domier Medical Systems, Inc.*, 134 F.3d 1458, 1467 (11th Cir. 1998).

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The most widely quoted dictum may be that of *Simpson v. Union Oil Co. of Cal.*, which indicated that “[t]he patent laws which give a [temporary] monopoly on ‘making, using, or selling the invention’ are in *pari materia* with the antitrust laws and modify them *pro tanto*.³⁴” 377 U.S. 13, 24 (1964). The apparent meaning of this statement is that the patent laws effectively modify the antitrust laws to the extent, and only to the extent, of precluding liability for the mere exclusion of others from making, using, or selling the patented invention.³⁴

46. The PTO explained:

Patents, trademarks, and copyrights are the principal means for establishing ownership rights to the creations, inventions, and brands that can be used to generate tangible economic benefits to their owner

Patents add to the incentive that inventors have to invest in costly research and development (R&D) by providing the [exclusive] opportunity to reap the rewards of their innovations

[C]opyrights provide the framework that incentivizes authors to create literary, artistic, musical, dramatic, cinematic, and other works by granting them the exclusive right to engage in the activities that derive economic benefits from their work.

Thus, patents and copyrights serve as tools to stimulate individual, firm, and industry level entrepreneurial ventures that feed into economic activities nationwide. To further exploit the potential of their competitive advantage, producers need effective ways to indicate to consumers the reliability of their products' source. A trademark “makes effective competition possible in a complex, impersonal marketplace by providing a means through which the consumer can identify products which please him and reward the producer with continued patronage.”³⁵

³⁴ “Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition,” U.S. Department of Justice and the Federal Trade Commission, April 2007, <https://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/p040101promotinginnovationandcompetitionrpt0704.pdf>, pp. 29-30 footnote 106.

³⁵ “Intellectual Property and the U.S. Economy: 2016 Update,” Economics & Statistics Administration and the U.S. Patent and Trademark Office, September 2016, <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf> (quoting *Smith v Chanel, Inc.*, 402 F.2d 562,566 (9th Cir. 1968), pp. 1-2.

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47. Trade secrets are an additional form of valuable IP. Trade secret laws protect sensitive manufacturing, services, and marketing activities vital to many companies. Like patents, the development of trade secrets can be costly. Unlike patents, trade secrets rights do not expire.³⁶

6.3. Free Riding in the Context of Intellectual Property

48. Broadly speaking, a free rider is any individual or entity who receives a benefit from a collective good without contributing towards the cost of its production. The free rider problem depicts how “the efficient production of important collective goods by free agents is jeopardized by the incentive each agent has not to pay for it.”³⁷ IP is particularly susceptible to free riding. Patents help limit free riding and facilitate commercialization of the IP the patents protect.³⁸

49. The World Intellectual Property Organization (“WIPO”) explained:

Patents recognize and reward inventors for their commercially successful inventions. As such they serve as an incentive for inventors to invent. The revenues generated from commercially successful patent-protected technologies make it possible to finance further technological research and development (R&D), thereby improving the chances of even better technology becoming available in the future. A patent can help stop unscrupulous third parties from free riding on the efforts of the inventor.³⁹

³⁶ Russell L. Parr, *Intellectual Property, Valuation, Exploitation, and Infringement Damages*, Fifth Edition, 2018, p. 4.

³⁷ “The Free Rider Problem,” Hardin, Russell and Garrett Cullity, *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/win2020/entries/free-rider>, p. 1.

³⁸ “To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,” U.S. Federal Trade Commission, October 2003, <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>, Chapter 2, p. 3.

³⁹ “Innovation and Intellectual Property,” World Intellectual Property Organization, https://www.wipo.int/ip-outreach/en/ipday/2017/innovation_and_intellectual_property.html, p. 2.

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Without patent rights, inventors may have to depend on secrecy to prevent others from free riding on their innovation. By shielding inventors from free-riding, patents allow inventors to discuss their work with other firms that can assist in commercializing an invention.⁴⁰

50. Patents promote further innovation by allowing for the dissemination of knowledge without the fear of theft or unauthorized use. Changes in patent policy over time have fostered the use and enforcement of patents with the aim of encouraging investments in innovation and improving the dissemination of knowledge.⁴¹

51. The FTC explained:

“The award of patent rights can spur stand-alone innovations by limiting free riding, facilitating commercialization of innovations, and encouraging disclosure of new ideas. Pharmaceutical companies, for example, rely on patents to prevent free riding, recoup their R&D investments, and learn about new technological breakthroughs.”⁴²

52. The concept of free riding has also been articulated in case law:

- In *SCFCILC, Inc. v. Visa USA, Inc.*, the Tenth Circuit held that a bylaw implemented by the Visa/MasterCard credit card network that prohibited certain network competitors from joining the network as card issuers should be evaluated under the rule of reason. Visa maintained it instituted the bylaw to protect its property from intersystem competitors who otherwise would enjoy a free ride at the time of entry. The court then reversed a jury verdict for the plaintiff and defended the legality of the bylaw under the rule of reason, deciding that the bylaw was reasonably necessary to prevent rural networks from free riding on the members’ investment in the Visa network.⁴³

⁴⁰ “To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,” U.S. Federal Trade Commission, October 2003, <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>, Chapter 2, p. 5.

⁴¹ “Patents and Innovation: Trends and Policy Changes,” Organisation for Economic Co-operation and Development, <https://www.oecd.org/science/inno/24508541.pdf>, p. 5.

⁴² “To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,” U.S. Federal Trade Commission, October 2003, <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>, Chapter 2, p. 71.

⁴³ *SCFCILC, Inc. v. Visa USA, Inc.*, 36 F.3d 958 (10th Cir. 1994). See also Darren S. Tucker, Antitrust Law Developments, Eighth Edition, 2017, p. 481.

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- In *Leegin v. PSKS*, based on Leegin's policy of refusing to sell to retailers that discount its goods below suggested prices, Leegin stopped selling to the PSKS store. PSKS then filed suit, alleging that Leegin violated antitrust laws by entering into vertical agreements with its retailers to set minimum resale prices. The Court opined that “absent vertical price restraints, the retail services that enhance interbrand competition might be underprovided. This is because discounting retailers can free ride on retailers who furnish services and then capture some of the increased demand those services generate. Consumers might learn, for example, about the benefits of a manufacturer's product from a retailer that invests in fine showrooms, offers product demonstrations, or hires and trains knowledgeable employees. Or consumers might decide to buy the product because they see it in a retail establishment that has a reputation for selling high-quality merchandise.”⁴⁴
- In *Continental T.V., Inc. v. GTE Sylvania, Inc.*, the Court upheld a supplier's restriction on the geographic area in which its distributor could sell. The Supreme Court acknowledged that consumers would ultimately benefit from a restriction on competition that prevented competitors from free riding on a firm's promotional efforts.⁴⁵
- In *Morris Communications v. PGA Tour*, the Eleventh Circuit upheld the district court's rejection of an antitrust claim based on the PGA's requirement that media companies delay their publication of scores from PGA tournaments. The court held that the PGA preventing media organizations from free riding on its substantial efforts to compile live golf scores was a valid business justification.⁴⁶

53. Unless the free rider problem is meaningfully addressed in some way, those who might otherwise undertake risky and expensive R&D will not do so. Fewer technologies will be developed, and consumers will face higher prices and fewer choices.⁴⁷

⁴⁴ *Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, 551 U.S. 877 (2007).

⁴⁵ *Continental T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36 (1977).

⁴⁶ *Morris Communications Corp. v. PGA Tour, Inc.*, 117 F. Supp. 2d 1322 (M.D. Fla. 2000). See also Darren S. Tucker, Antitrust Law Developments, Eighth Edition, 2017, p. 269.

⁴⁷ Charles F. Rule, Technology Licensing and the Second American Revolution: Storming the Ramparts of Antitrust and Misuse, Before the John Marshall Law School 5 (Feb. 22, 1985); “To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,” U.S. Federal Trade Commission, October 2003, <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>, Chapter 1, p. 23.

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6.4. Intellectual Property Licensing

54. IP owners, having accepted the risk, invested in innovation, and obtained patents, copyrights, trademarks, and/or trade secrets, have the right to seek a return on their investment.⁴⁸ One strategy is to use the IP owner's right of exclusion and prevent use of the intellectual property by others.⁴⁹ An alternative available method for an IP owner to obtain a return on its investment in innovation is to license some or all of their IP. An IP owner does not typically, however, have an obligation to grant a license to its IP, nor is an IP owner denied the ability to enforce its IP because it refused to license its IP.⁵⁰ For example, 35 U.S.C. 271(d)(4) codifies this principle with respect to patents:

No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having....refused to license or use any rights to the patent.⁵¹

55. A patent license allows an IP owner to retain ownership of their IP while receiving some sort of compensation in exchange for giving up the IP owner's exclusive rights to the IP. Licenses can facilitate the commercialization of the IP owner's inventions and encourage public disclosure.⁵² The U.S. Department of Justice and the Federal Trade Commission have observed:

Licensing, cross-licensing, or otherwise transferring intellectual property (hereinafter "licensing") can facilitate integration of the licensed property with complementary factors of production. This integration can lead to more efficient exploitation of the intellectual property, benefiting consumers through the reduction of costs and the introduction of new products. Such arrangements increase the value of intellectual property to consumers and owners. Licensing can allow an innovator to capture returns from its investment in making and developing an invention through royalty

⁴⁸ "Intellectual Property Strategy and Business Strategy: Connections through Innovation Strategy," Danny Samson, June 2005. Accessed on January 7, 2021, https://www.researchgate.net/publication/228740384_Intellectual_Property_Strategy_and_Business_Strategy_Connections_through_Innovation_Strategy, p. 4.

⁴⁹ Russell L. Parr, *Intellectual Property, Valuation, Exploitation, and Infringement Damages*, Fifth Edition, 2018, pp. 177-178.

⁵⁰ 35 U.S.C. § 271(d)(4).

⁵¹ 35 U.S.C. § 271(d)(4).

⁵² "Antitrust Guidelines for the Licensing of Intellectual Property," *U.S. Department of Justice and the Federal Trade Commission*, January 12, 2017,

https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf, pp. 5-6.

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payments from those that practice its invention, thus providing an incentive to invest in innovative efforts.⁵³

56. The intellectual property laws do not set out any particular way that an IP owner must license their IP. Instead, “[l]icensing is a basic intellectual property deal making strategy.”⁵⁴ The law protects IP owners to select the strategy they find most beneficial, if they decide to license their IP rights, including the scope of the exclusive rights to be licensed, whether the license is exclusive or non-exclusive, whether they will seek a payment, the form of payment they choose to seek (one-time payment or running royalty (percentage or per unit), tiered royalties, structured payment terms or a combination), the length of the license provided, revocability, restrictions on use of the intellectual property, and terms regarding the ownership of related IP that is developed as a result of the license.

57. The terms that an IP owner finds appropriate to their interests may depend on the nature of the IP being licensed, the scope of the license, and the nature and circumstances of a licensee’s intended use of that IP. An exclusive license permits only one licensee to access and use the protected technology, while a non-exclusive right grants such access and use to multiple entities.⁵⁵ One time payments may ensure a return to the IP owner and limit costs for managing the license while a payment structure of an ongoing royalty that depends on future sales by the licensee allows the IP owner to share in the success of the licensee that results at least in part from the use of the innovation of the IP owner. IP owners may choose a structure that combines lump sum and ongoing royalty fees.

58. An IP owner may choose not to confer comprehensive rights to even an exclusive licensee; for example, a patent licensee may not receive “all substantial rights” in a patent, or may receive exclusive rights to practice a patent only in a particular geographical area or a particular “field of use.”⁵⁶ In such circumstances, a licensee may be permitted to use the IP only for certain purposes. Such limitations preserve various forms of exclusivity for the IP owner and have various benefits:

⁵³ “Antitrust Guidelines for the Licensing of Intellectual Property,” U.S. Department of Justice and the Federal Trade Commission, January 12, 2017,

https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf, p. 5.

⁵⁴ Russell L. Parr, *Intellectual Property, Valuation, Exploitation, and Infringement Damages*, Fifth Edition, 2018, p. 184.

⁵⁵ *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1552 (Fed. Cir. 1995).

⁵⁶ *International Gamco, Inc. v. Multimedia Games, Inc.*, 504 F.3d 1273, 1276 (Fed. Cir. 2007); “Antitrust Guidelines for the Licensing of Intellectual Property,” U.S. Department of Justice and the Federal Trade Commission, January 12, 2017, https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf, p. 5.

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Field-of-use, territorial, and other limitations on intellectual property licenses may serve procompetitive ends by allowing the licensor to exploit its property as efficiently and effectively as possible. These various forms of exclusivity can be used to give a licensee an incentive to invest in the commercialization and distribution of products embodying the licensed intellectual property and to develop additional applications for the licensed property. The restrictions may do so, for example, by protecting the licensee against free riding on the licensee's investments by other licensees or by the licensor. They may also increase the licensor's incentive to license, for example, by protecting the licensor from competition in the licensor's own technology in a market niche that it prefers to keep to itself. The benefits of licensing restrictions apply to patent, copyright, and trade secret licenses, and to know-how agreements.⁵⁷

59. When it comes to monetizing IP, or generating an economic return from IP investments, IP owners have several options. Methods of IP monetization can be considered either direct or indirect:

Indirect monetization through direct use and blocking is generally pursued with the intent of capitalizing upon sources of proprietary competitive advantage enabled by the IP that lead to greater revenues and profits. In contrast, direct asset monetization is pursued in an attempt to obtain payments from IP users by selling, licensing or asserting the IP. **Since direct asset monetization relies upon IP use and payment by others, monetization risks associated with royalty reporting, litigation and collection are introduced that don't exist with direct use or blocking where no external payment is required.**⁵⁸

60. Regardless of the monetization strategy chosen by an owner of IP, the fundamental premise of investment risk being accompanied by commensurate reward applies. IP owners must be compensated for their investments for there to be an incentive to innovate.

⁵⁷ "Antitrust Guidelines for the Licensing of Intellectual Property," U.S. Department of Justice and the Federal Trade Commission, January 12, 2017,

https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf, p. 5.

⁵⁸ "Risk and Return: Understanding the Cost of Capital for Intellectual Property, Part 1 of 2," Glenn Perdue, *les Nouvelles*, October 2015 (emphasis added).

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7. IOS AND THE APP STORE

7.1. Launch of the iPhone

61. Apple introduced the iPhone in January 2007.⁵⁹ The iPhone combined the communication functions of a cellphone with the music and video features of an iPod and a web-browser that made it easy for users to browse and navigate the entire Internet.⁶⁰

62. In his introduction of the iPhone at the MacWorld Conference on January 9, 2007, Mr. Jobs first told the conference that Apple was announcing the introduction of three revolutionary devices, and then revealed that those three devices – a mobile phone, a widescreen iPod with touch controls, and a breakthrough internet communications device with desktop-class email, web browsing, searching, and maps – were actually one device: the iPhone.⁶¹

⁵⁹ “Apple Reinvents the Phone with iPhone” *Apple*, January 9, 2007, <https://www.apple.com/newsroom/2007/01/09Apple-Reinvents-the-Phone-with-iPhone/>.

⁶⁰ FCC 08-028, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 8.

⁶¹ “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 1:22, <https://www.youtube.com/watch?v=x7qPAY9jqE4>; “Apple Reinvents the Phone with iPhone” *Apple*, January 9, 2007, <https://www.apple.com/newsroom/2007/01/09Apple-Reinvents-the-Phone-with-iPhone/>.

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Figure 2: Steve Jobs Introduces the iPhone – Three Revolutionary Devices in One⁶²



63. The iPhone “set an entirely new paradigm for computer-based phones.”⁶³ According to the FCC, “the 2007 launch of the iPhone and 2008 launch of the iPhone 3G catalyzed the development of a new type of device in the mobile wireless ecosystem.”⁶⁴

64. Since the iPhone launched in 2007, Apple has continued its investment in the iOS ecosystem, including, among other things, enhancing value by adding features to new generations of the iPhone and new versions of iOS. Each component of the iOS ecosystem has and contributes value, even if no value is assigned to the individual components. The ecosystem was planned to create a whole greater than the sum of its parts: the seamless integration of favorite features combined with new innovations across the ecosystem.⁶⁵

⁶² “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 2:18, <https://www.youtube.com/watch?v=x7qPAY9jqE4>.

⁶³ “The Brief History of Smartphones” Tuan C. Nguyen, *ThoughtCo.*, January 30, 2021, <https://www.thoughtco.com/history-of-smartphones-4096585>.

⁶⁴ FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 79.

⁶⁵ Timothy Cook, Deposition, February 12, 2021, p. 139:14-17; Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, pp. 3, 6.

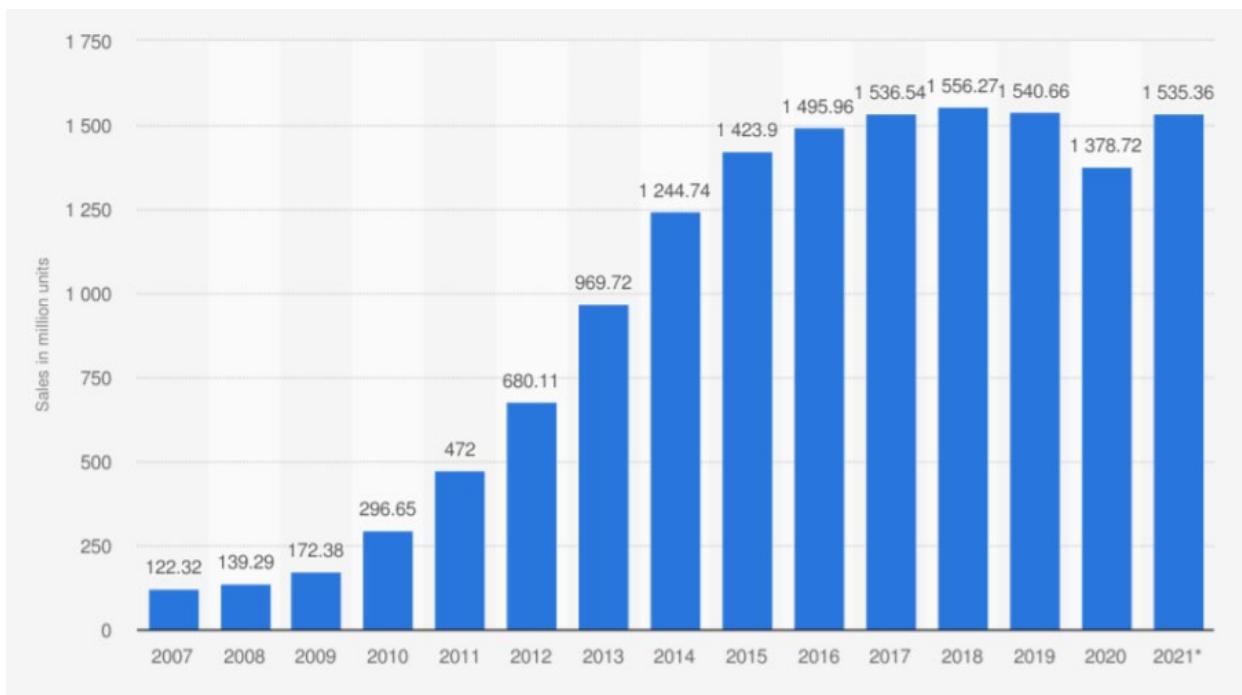
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65. Apple's chief executive officer ("CEO"), Tim Cook,⁶⁶ testified that: "[The iOS ecosystem] [is] all of the software and hardware that you can use with iOS devices."⁶⁷ Eddy Cue, Apple's Senior Vice President of Internet Services and Software,⁶⁸ explained that "[w]hen [Apple is] looking at features that [it] want[s] to add, [Apple is] thinking about features that are – that provide functionality features, ideally things that you can't get anywhere else so that it makes [Apple's] products better."⁶⁹

66. After the iPhone launched and as its features were enhanced, users found increasingly diversified uses for their smartphones, resulting in dramatic increases in smartphone sales.

Figure 3: Worldwide Smartphone Sales and Users 2007 – 2021⁷⁰



⁶⁶ Timothy Cook, Deposition, February 12, 2021, p. 21:23-25.

⁶⁷ Timothy Cook, Deposition, February 12, 2021, p. 71:16-19.

⁶⁸ Eddy Cue, Deposition, February 8, 2021, p. 24:13-14.

⁶⁹ Eddy Cue, Deposition, February 8, 2021, pp. 58:4-59:12.

⁷⁰ "Number of smartphones sold to end users worldwide from 2007 to 2021," Statista, <https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/>.

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67. The iPhone has been a tremendous engine for creativity, spawning the creation of over 50,000 new iPhone software applications within the first year of the App Store. Those applications were downloaded by users more than one billion times during the first year of the App Store.⁷¹

7.2. iOS and the App Store

68. The iOS operating system “interprets the commands of software applications (apps) and it gives those apps access to features of the device, such as the multi-touch screen or the storage.”⁷² The iPhone released in 2007 used the first version of iOS (although it was not called “iOS” at the time).⁷³ The current version of iOS is iOS 14.7.1, first released in July 2021.⁷⁴

69. When the iPhone was launched in 2007, it did not include third-party apps, nor did Apple permit the use of iOS by third-parties to create apps; “the only native apps [for the iPhone] were first party apps from Apple.”⁷⁵ In that period Apple announced that developers can “create Web 2.0 applications which look and behave just like the applications built into iPhone, and which can seamlessly access iPhone’s services, including making a phone call, sending an email and displaying a location in Google Maps.”⁷⁶ “[A] user could access and utilize web applications, but the [user’s iPhone] did not interoperate with any applications software that a consumer might download from a third party.”⁷⁷ Apple’s then-CEO Mr. Jobs stated: “Our innovative approach, using Web 2.0-based standards, lets developers create amazing new applications while keeping the iPhone secure and reliable.”⁷⁸

⁷¹ Schedule 5.0.

⁷² “What is the iPhone OS (iOS)? iOS is the operating system for Apple’s mobile devices,” Daniel Nations, *Lifewire*, November 9, 2019, <https://www.lifewire.com/what-is-ios-1994355>.

⁷³ “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 8:42, <https://www.youtube.com/watch?v=x7qPAY9jqE4>.

⁷⁴ “Apple security updates,” Apple, <https://support.apple.com/en-us/HT201222>.

⁷⁵ Philip Schiller, Deposition, February 11, 2021, p. 217:21-25.

⁷⁶ “iPhone to Support Third-Party Web 2.0 Applications,” *Apple*, June 11, 2007, <https://www.apple.com/newsroom/2007/06/11iPhone-to-Support-Third-Party-Web-2-0-Applications/>.

⁷⁷ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 4.

⁷⁸ “iPhone to Support Third-Party Web 2.0 Applications,” *Apple*, June 11, 2007, <https://www.apple.com/newsroom/2007/06/11iPhone-to-Support-Third-Party-Web-2-0-Applications/>.

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70. This changed. In March 2008, Apple introduced the new iPhone Developer Program.⁷⁹ It was accompanied by Apple's release of a software development kit that Apple had created for third-party developers to create native applications for the iPhone.⁸⁰ Apple's SDK contained a set of APIs and tools enabling independent software developers to design applications for the iPhone.⁸¹ When announcing the launch of Apple's SDK, Mr. Jobs explained: "I think Web applications have worked really well for what they do but developers did give us the feedback that they wanted to do even more, that they thought this platform that we created was revolutionary and they really wanted in and we heard that and we've been working on this."⁸² According to Apple, within "the first four days after its launch, there were more than 100,000 downloads of the SDK, a number that ballooned to 250,000 in a little over three months as iPhone application developers proliferated."⁸³

71. In July 2008, Apple released the second version of the iPhone's operating system, "which was designed to allow iPhone owners to safely and reliably download third party applications."⁸⁴ Apple launched the App Store at the same time as a "centralized repository where developers post, and users seamlessly review, preview and download thousands of newly created third[-]party applications."⁸⁵ Mr. Schiller explained: "We built [the App Store] to enable something that didn't

⁷⁹ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 4; APL-APPSTORE_00000055-87 at '86.

⁸⁰ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 4.

⁸¹ "Apple Announces iPhone 2.0 Software Beta," *Apple*, March 6, 2008, <https://www.apple.com/newsroom/2008/03/06Apple-Announces-iPhone-2-0-Software-Beta/>; Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 4.

⁸² APL-APPSTORE_00000055-87 at '85.

⁸³ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 4.

⁸⁴ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, pp. 4-5.

⁸⁵ "The Mobile Industry's Never Seen Anything Like This: An Interview with Steve Jobs at the App Store's Launch," *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>; Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, pp. 4-5.

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exist at all and that's what we were building, a safe way to download native apps where there was no way to download native apps before.”⁸⁶

72. Apple described its purpose in launching the App Store as “to add value to the iPhone.”⁸⁷ Apple explained to the Copyright Office in 2009:

The iPhone Developer Program and the App Store have played a significant part in the success of the 3G iPhone. The availability of hundreds, then thousands, and today over 15,000 innovative iPhone applications quickly became a primary differentiator for the iPhone in what many consider to be the single most crowded and competitive consumer electronics market in the world. iPhone applications – not the ability to make phone calls – were the primary emphasis of Apple’s advertising campaign for the 3G iPhone. The App Store created an unprecedented opportunity for iPhone software developers to meet and conduct business with iPhone users.⁸⁸

73. Apple’s CEO, Tim Cook,⁸⁹ testified that: “[D]evelopers would be a part of [the iOS] ecosystem, a very important part of the ecosystem.”⁹⁰

74. The App Store has been “beneficial to developers and consumers, [by] essentially eliminating the principal barrier to commerce: the means for iPhone developers to find potential customers in a secure and trusted marketplace.”⁹¹ In fact, the “cellphone app store” was named the 2008 “Tech Idea of the Year” by the New York Times tech writer David Pogue.⁹²

⁸⁶ Philip Schiller, Deposition, February 11, 2021, p. 220:1-5.

⁸⁷ “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>.

⁸⁸ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 6.

⁸⁹ Timothy Cook, Deposition, February 12, 2021, p. 21:23-25.

⁹⁰ Timothy Cook, Deposition, February 12, 2021, p. 71:16-19.

⁹¹ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 6.

⁹² “Envelope, Please. It’s a Pogie,” David Pogue, *The New York Times*, Dec. 17, 2008, www.nytimes.com/2008/12/18/technology/personaltech/18pogue.html.

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75. Users of iPhone and iPod touch devices downloaded more than 10 million applications in the first weekend after the launch of the App Store.⁹³ Over 60 million apps were downloaded from the App Store in its first 30 days, which was 30 percent of the number of iTunes song downloads during the same period. This success was surprising to Mr. Jobs since iTunes had five years of prior market availability to attract users.⁹⁴

76. By July 11, 2008, when the iPhone 3G was released, more than 500 native apps were available in the App Store.⁹⁵ On July 14, 2008, Apple reported that more than 800 apps were available on the App Store and more than 10 million apps had been downloaded.⁹⁶ By January 2010, there were over 140,000 apps available in the App Store and there had been more than three billion cumulative downloads from the App Store by iPhone and iPod touch users.⁹⁷ By November 2020, 1.8 million apps were available from the App Store and more than 180 billion downloads of apps had occurred.⁹⁸

⁹³ “iPhone App Store Downloads Top 10 Million in First Weekend,” *Apple*, July 14, 2008, <https://www.apple.com/newsroom/2008/07/14iPhone-App-Store-Downloads-Top-10-Million-in-First-Weekend/>.

⁹⁴ “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>.

⁹⁵ “iPhone 3G on Sale Tomorrow,” *Apple*, July 10, 2008, <https://www.apple.com/newsroom/2008/07/10iPhone-3G-on-Sale-Tomorrow/>.

⁹⁶ “iPhone App Store Downloads Top 10 Million in First Weekend,” *Apple*, July 14, 2008, <https://www.apple.com/newsroom/2008/07/14iPhone-App-Store-Downloads-Top-10-Million-in-First-Weekend/>.

⁹⁷ “Apple’s App Store Downloads Top Three Billion,” *Apple*, January 5, 2010, <https://www.apple.com/newsroom/2010/01/05Apples-App-Store-Downloads-Top-Three-Billion/>; “Apple Launches iPad,” *Apple*, January 27, 2010, <https://www.apple.com/newsroom/2010/01/27Apple-Launches-iPad/>.

⁹⁸ “Apple unveils all-new App Store,” *Apple*, June 5, 2017, <https://www.apple.com/newsroom/2017/06/apple-unveils-all-new-app-store/>; “Apple Announces App Store Small Business Program,” *Apple*, November 18, 2020, <https://www.apple.com/newsroom/2020/11/apple-announces-app-store-small-business-program/>.

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**Figure 4: App Store Applications and Downloads⁹⁹**

Date	Available Apps	Cumulative Downloads
07/11/2008	500+	-
07/14/2008	800+	10,000,000+
01/16/2009	15,000+	500,000,000+
01/27/2010	140,000+	3,000,000,000+
01/22/2011	350,000+	10,000,000,000+
03/05/2012	550,000+	25,000,000,000+
01/07/2013	775,000+	40,000,000,000+
06/02/2014	1,200,000+	75,000,000,000+
06/08/2015	1,500,000+	75,000,000,000+
06/13/2016	2,000,000+	125,000,000,000+
01/05/2017	2,100,000+	130,000,000,000+
11/18/2020	1,800,000	180,000,000,000+

77. On the tenth anniversary of the App Store, Apple highlighted what the App Store provides to developers:

Before 2008, the software industry was dominated by a few large companies. The App Store opened the door for any developer, from one-person shops to large studios, to come up with a great idea, build a high quality app and seamlessly deliver it to the growing number of customers.¹⁰⁰

78. The developer benefits of the App Store were recognized by many. As Keith Shepherd and Natalia Luckyanova, developers of popular gaming apps, described:

The App Store and iPhone changed our lives. Our first game, Imangi, launched the day the App Store opened. Fast forward 10 years, and we've created over 10 games, including Temple Run, which has been downloaded over a BILLION times. Our studio has grown

⁹⁹ Schedule 5.0.

¹⁰⁰ "The App Store turns 10," *Apple*, July 5, 2018, <https://www.apple.com/newsroom/2018/07/app-store-turns-10/>.

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from the two of us to a team of 35. None of this would have been possible without the App Store.¹⁰¹

79. Apple has continued to expand opportunities for consumers and developers by investing to advance the technology in its App Store and developer tools. On March 17, 2009, Apple released a beta iPhone OS 3.0, which included “an updated Software Development Kit (SDK) with over 1,000 new Application Programming Interfaces (APIs) including In-App Purchases.”¹⁰² Apple stated that “In-App Purchases will allow developers to offer subscription content and provide the ability to sell new content and features in a simple and secure process.”¹⁰³

80. Apple also makes investments in the technology for keeping the App Store secure. Apple positions the App Store as a “safe and trusted place to discover and download apps,” promoting that:

[T]he App Store is more than just a storefront – it’s an innovative destination focused on bringing you amazing experiences. And a big part of those experiences is ensuring that the apps we offer are held to the highest standards for privacy, security, and content. Because we offer nearly two million apps – and we want you to feel good about using every single one of them.¹⁰⁴

81. Since the beginning of the App Store, Apple has taken a “a multilayered approach to try to keep the iPhone reliable and secure for [Apple’s] customers.”¹⁰⁵ The App Store, which comprises 175 storefronts in over 40 languages, has “100% of apps … automatically screened for known malware.”¹⁰⁶ “Over 10K apps use Apple health technologies like HealthKit, CareKit, and ResearchKit designed to protect patient privacy.”¹⁰⁷ As additional protection, apps on the iPhone are not permitted to pull user data from other apps.¹⁰⁸ To ensure compliance with Apple’s

¹⁰¹ “The App Store turns 10,” *Apple*, July 5, 2018, <https://www.apple.com/newsroom/2018/07/app-store-turns-10/>.

¹⁰² “Apple Previews Developer Beta of iPhone OS 3.0,” *Apple*, March 17, 2009, <https://www.apple.com/newsroom/2009/03/17Apple-Previews-Developer-Beta-of-iPhone-OS-3-0/>.

¹⁰³ “Apple Previews Developer Beta of iPhone OS 3.0,” *Apple*, March 17, 2009, <https://www.apple.com/newsroom/2009/03/17Apple-Previews-Developer-Beta-of-iPhone-OS-3-0/>.

¹⁰⁴ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

¹⁰⁵ “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>.

¹⁰⁶ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

¹⁰⁷ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

¹⁰⁸ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

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guidelines, “[e]very week over 500 dedicated experts around the world review over 100K apps.”¹⁰⁹ Apple reports that it rejected over 215,000 apps in 2020 for violating privacy guidelines, over 48,000 apps for containing hidden or undocumented features, and over 150,000 apps for being spam, copycats, or misleading to users.¹¹⁰ Apple has extensive fraud detection measures which offer substantial protection to their users. Apple reports that its fraud prevention services blocked over \$1.5 billion in fraudulent transactions from taking place and denied purchases from over 3 million stolen credit or debit cards in 2020.¹¹¹ Also in 2020, Apple terminated approximately 470,000 developer accounts and rejected an additional 205,000 developer enrollments over fraud concerns, preventing malicious actors from ever submitting an app to the app store. Apple also works to enforce intellectual property rights by taking down apps that do not have rights to include copyrighted materials.¹¹²

7.3. Overview of Apple Agreements with iOS Users

82. All users of an iOS device are required to agree to be bound by the terms of an “iOS and iPadOS Software License Agreement” before they use or download any software for their iOS device, including iOS version updates.¹¹³ The iOS and iPadOS Software License Agreement for a recent version of iOS, iOS 14.0, requires users to agree to the following terms:

By using your device or downloading a software update, as applicable, you are agreeing to be bound by the terms of this license. If you do not agree to the terms of this license, do not use the device, or download the software update. If you have recently purchased a device and you do not agree to the terms of the license, you

¹⁰⁹ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

¹¹⁰ “App Store stopped more than \$1.5 billion in potentially fraudulent transactions in 2020,” *Apple Newsrom*, May 11, 2021, <https://www.apple.com/newsroom/2021/05/app-store-stopped-over-1-5-billion-in-suspect-transactions-in-2020/>.

¹¹¹ “App Store stopped more than \$1.5 billion in potentially fraudulent transactions in 2020,” *Apple Newsrom*, May 11, 2021, <https://www.apple.com/newsroom/2021/05/app-store-stopped-over-1-5-billion-in-suspect-transactions-in-2020/>.

¹¹² “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>; “App Store Review Guidelines,” *Apple*, <https://developer.apple.com/app-store/review/guidelines/>; “App Store stopped more than \$1.5 billion in potentially fraudulent transactions in 2020,” *Apple Newsrom*, May 11, 2021, <https://www.apple.com/newsroom/2021/05/app-store-stopped-over-1-5-billion-in-suspect-transactions-in-2020/>.

¹¹³ “iOS and iPadOS Software License Agreement,” *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, p.1.

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may return the device within the return period to the Apple Store or authorized distributor where you obtained it for a refund.¹¹⁴

83. Apple reinforces its protection of its intellectual property in the user's Software License Agreement by providing only "a limited non-exclusive license to use the Apple Software on a single Apple-branded Device:"

The software (including Boot ROM code, embedded software and third party software), documentation, interfaces, content, fonts and any data that came with your Device ("Original Apple Software"), as may be updated or replaced by feature enhancements, software updates or system restore software provided by Apple ("Apple Software Updates"), whether in read only memory, on any other media or in any other form (the Original Apple Software and Apple Software Updates are collectively referred to as the "Apple Software") are licensed, not sold, to you by Apple Inc. ("Apple") for use only under the terms of this License. Apple and its licensors retain ownership of the Apple Software itself and reserve all rights not expressly granted to you. You agree that the terms of this License will apply to any Apple-branded app that may be built-in on your Device, unless such app is accompanied by a separate license, in which case you agree that the terms of that license will govern your use of that app.¹¹⁵

84. Apple's Software License Agreement specifies that it does not provide rights to iOS users for the use of intellectual property for developing applications, among other exclusions:

This License does not grant you any rights to use Apple proprietary interfaces and other intellectual property in the design, development, manufacture, licensing or distribution of third party devices and accessories, or third party software applications, for use with Devices. Some of those rights are available under separate licenses from Apple.¹¹⁶

¹¹⁴ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, p. 1.

¹¹⁵ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, pp. 1-2.

¹¹⁶ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, p. 2

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85. In the user's Software Agreement, Apple requires the user to agree to various restrictions on access to and use of Apple Software available on their device, as well as content displayed by, stored on, or accessed through their device:

- (d) You may not, and you agree not to or enable others to, copy (except as expressly permitted by this License), decompile, reverse engineer, disassemble, attempt to derive the source code of, decrypt, modify, or create derivative works of the Apple Software or any services provided by the Apple Software or any part thereof (except as and only to the extent any foregoing restriction is prohibited by applicable law or by licensing terms governing use of open-source components that may be included with the Apple Software). You agree not to remove, obscure, or alter any proprietary notices (including trademark and copyright notices) that may be affixed to or contained within the Apple Software.
- (e) The Apple Software may be used to reproduce materials so long as such use is limited to reproduction of non-copyrighted materials, materials in which you own the copyright, or materials you are authorized or legally permitted to reproduce. Title and intellectual property rights in and to any content displayed by, stored on or accessed through your Device belong to the respective content owner. Such content may be protected by copyright or other intellectual property laws and treaties, and may be subject to terms of use of the third party providing such content. Except as otherwise provided herein, this License does not grant you any rights to use such content nor does it guarantee that such content will continue to be available to you.¹¹⁷

7.4. The Apple Developer Program

7.4.1. Overview of the Apple Developer Program

86. Apple has invested in innovating and developing tools, software, and other technology for the development, testing and distribution of apps to be distributed through Apple's App Store and made available on Apple's iOS devices. Apple chose to create the "Apple Developer Program" (or, the "Developer Program") to enable app developers to access and use protected Apple technology and services for their own development and testing of apps, as well as the ultimate distribution of such apps through the App Store. Through the Apple Developer Program, app developers can obtain limited "licenses to access a broad array of tools, software and other intellectual property

¹¹⁷ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, p. 2.

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created and continuously refined by Apple, including the SDKs, operating systems and other software ... as well as the App Store Connect suite of web-based tools to distribute pre-release versions of apps via TestFlight and to publish approved apps on the App Store.”¹¹⁸ The Apple Developer Program includes access to beta OS releases, advanced app capabilities, and tools needed to develop, test, and distribute apps and Safari Extensions.¹¹⁹

87. Additionally, through the Apple Developer Program:

Apple personnel are available to advise developers on ways to improve their products and grow their businesses. Developers also benefit from Apple’s marketing, editorial, and promotional support to attract new users, and Apple’s distribution services and systems make it easy for developers to close sales and deliver software in a safe and secure manner, no matter where in the world their customers live, what language they speak, or what currency they use. Apple even helps developers navigate complicated foreign taxation systems by sorting through the requirements of different countries to assure that any required taxes are withheld. The App Store is constantly evolving as Apple and its engineers continuously innovate to meet and exceed the needs and expectations of developers while ensuring that Apple customers always are treated to the best digital shopping experience.¹²⁰

88. Apple provides limited licenses to download and use beta versions of its newest version of iOS, along with beta versions of its other operating systems, to Apple Developer Program members so app developers may integrate and test their apps and ensure the apps are up-to-date once Apple releases its software to the public. A beta release is a prerelease version of software that is not public and still under development by Apple.¹²¹ As of August 4, 2021, iOS 14.7.1 is the currently-available iOS version¹²² and the following betas are available through the Apple Developer Program:

¹¹⁸ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, pp. 5-6.

¹¹⁹ “Membership Details,” *Apple*, <https://developer.apple.com/programs/whats-included/>; “From Code to Customer,” *Apple*, <https://developer.apple.com/programs/>.

¹²⁰ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, p. 2.

¹²¹ “Using Apple Beta Software,” *Apple*, <https://developer.apple.com/support/beta-software/>.

¹²² “Apple security updates,” *Apple*, <https://support.apple.com/en-us/HT201222>.

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- Xcode: 13 beta 4 – released July 27, 2021.
- macOS: Monterey beta 4 – released July 27, 2021.
- iOS: 15 beta 4 – released July 27, 2021.
- iPadOS: 15 beta 4 – released July 27, 2021.
- watchOS: 8 beta 4 – released July 27, 2021.
- tvOS: 15 beta 4 – released July 27, 2021.¹²³

89. Tools for configuring app services, managing development teams and submitting new apps and updates licensed through the Apple Developer Program, include:

- Xcode – an integrated development environment (“IDE”) for macOS, used to develop software for macOS, iOS, iPadOS, watchOS and tvOS. Provides developers the software features that are necessary to design, develop, and debug software for use on iOS and macOS;¹²⁴
- Swift – a programming language developed by Apple for iOS, macOS, watchOS and tvOS apps;¹²⁵
- TestFlight – a service for installation and testing of apps and app clip experiences for mobile applications. Allows developers to beta test apps and collect feedback before releasing on the App Store;¹²⁶
- App Store Connect – suite of web-based tools that allow developers to upload, submit and manage apps on the App Store. Also allows developers to view sales reports, access app analytics, invite users to test apps with TestFlight, and add IAP, among other functionality;¹²⁷
- Create ML – a framework intended to help app developers build, train, and deploy machine learning models using Swift and Xcode. It is used to create and train custom machine

¹²³ “News and Updates,” *Apple*, <https://developer.apple.com/news/releases/>.

¹²⁴ “Xcode,” *Apple*, <https://developer.apple.com/documentation/xcode/>.

¹²⁵ “Swift,” *Apple*, <https://developer.apple.com/swift/>.

¹²⁶ “Beta Testing Made Simple with TestFlight,” *Apple*, <https://developer.apple.com/testflight/>.

¹²⁷ “App Store Connect,” *Apple*, <https://developer.apple.com/app-store-connect/>.

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learning models for use on apps. Models can be trained to perform tasks like recognizing images, extracting meaning from text, or finding relationships between numerical values;¹²⁸

- Reality Composer – a tool for prototyping and producing content for AR experiences. Converts existing 3D models to USDZ to work seamlessly with tools and on all AR-enabled iPhone and iPad devices,¹²⁹ and
- Certificates, identifiers, and profiles that enable development, distribution, and services for apps.¹³⁰

90. An extensive library of copyrighted developer documentation and code, including tutorials, sample code, articles and APIs is available to app developers.¹³¹ Apple's SDKs feature more than 150,000 APIs on iOS.¹³² Apple provides APIs and software for a vast variety of tasks that developers wish to implement, and the number of APIs provided to developers has increased exponentially from around 10,000 in 2008 to 150,000 today.¹³³

91. Apple licenses access to copyrighted sample code to Apple Developer Program members. For example, the Apple Developer Program currently provides sample code for at least the following features:

- Adopting menus and UIActions in a user interface and creating custom menu experiences;
- Building a feature-rich app for sports analysis by detecting and classifying human activity in real time using computer vision and machine learning;
- Building widgets using WidgetKit and SwiftUI, which show an app's content on the Home screen, with custom intents for user-customizable settings; and

¹²⁸ “Membership Details,” *Apple*, <https://developer.apple.com/programs/whats-included/>; “Introducing Create ML,” *Apple*, <https://developer.apple.com/videos/play/wwdc2018/703/>; “Create ML,” *Apple*, <https://developer.apple.com/documentation/createmu>.

¹²⁹ “AR Creation Tools,” *Apple*, <https://developer.apple.com/augmented-reality/tools/>; “RealityKit and Reality Composer, AR tools from Apple: A cheat sheet,” Cory Bohon, *Tech Republic*, June 8, 2019, <https://www.techrepublic.com/index.php/article/realitykit-and-reality-composer-ar-tools-from-apple-a-cheat-sheet/>.

¹³⁰ “Certificates,” *Apple*, <https://developer.apple.com/account/resources/certificates/list>; “Identifiers,” *Apple*, <https://developer.apple.com/account/resources/identifiers/list>; “Profiles,” *Apple*, <https://developer.apple.com/account/resources/profiles/list>.

¹³¹ “Apple Developer Documentation,” *Apple*, <https://developer.apple.com/documentation/>.

¹³² Philip Schiller, Deposition, February 11, 2021, p. 295:24-296:16.

¹³³ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,894:15-22, 2,895:6-14.

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- Creating a shared codebase to build a multiplatform app that offers widgets and an app clip.¹³⁴

92. In addition to the software tools and services identified in this section, membership in the Apple Developer Program may permit app developers to access Apple services like Apple Pay, PassKit, MusicKit, Push Notifications, SiriKit and Shortcuts, Sign in with Apple, and FairPlay Streaming.¹³⁵ Apple Developer Program members can obtain Apple-issued keys for connecting to services like MusicKit, DeviceCheck, APNs, CloudKit and Wallet.¹³⁶

7.4.2. Licenses Governing Apple Developer Program and Related Intellectual Property

93. In order to access any of the protected software, tools, and overall technology in Apple's proprietary library of app development software and tools, as well as the various distribution, marketing, and other services that Apple provides through the App Store, app developers must first enter into certain agreements with Apple. The most notable of these agreements are the Developer Agreement ("Developer Agreement") and the Developer Program License Agreement ("License Agreement").¹³⁷

94. A developer must execute the Developer Agreement in order to be able to log into and access Apple's online developer portal.¹³⁸ The Developer Agreement governs certain foundational elements of the relationship between Apple and a developer, including confidentiality and protection of Apple's IP rights.¹³⁹ A developer cannot enter into any other agreements with Apple until it has first executed the Developer Agreement and the developer must remain a party to the Developer Agreement to enter into any other agreements with Apple.¹⁴⁰

95. The Apple Developer Agreement provides developers with a license to certain proprietary app development tools, such as Xcode and SDKs, that Apple created to help developers "learn how

¹³⁴ "Sample Code," *Apple*, <https://developer.apple.com/wwdc20/sample-code/>.

¹³⁵ "Membership Details," *Apple*, <https://developer.apple.com/programs/whats-included/>.

¹³⁶ Epic Games, Inc.'s Notice of Motion and Motion for Temporary Restraining Order and Order to Show Cause Why a Preliminary Injunction Should Not Issue and Memorandum of Points and Authorities in Support Thereof, August 17, 2020, Exhibit B, p. 3.

¹³⁷ Trial Transcript, Testimony of Phillip Schiller, May 17, 2021, Trial at 2,757:1-2,761:20.

¹³⁸ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,757:9-16.

¹³⁹ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,757:1-2759:3.

¹⁴⁰ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.'s Opposition to Plaintiff's Motion for a Preliminary Injunction, September 15, 2020, p. 4.

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to develop apps for Apple platforms for free.”¹⁴¹ The license provided under the Apple Developer Agreement is limited. The agreement states:

Copyright and other intellectual property laws protect the Site and Content provided to [the developer], and [the developer] agree[s] to abide by and maintain all notices, license information, and restrictions contained therein. Unless expressly permitted herein or otherwise permitted in a separate agreement with Apple, [the developer] may not modify, publish, network, rent, lease, loan, transmit, sell, participate in the transfer or sale of, reproduce, create derivative works based on, redistribute, perform, display, or in any way exploit any of the Site, Content, or Services. [The Apple Developer entity] may not decompile, reverse engineer, disassemble, or attempt to derive the source code of any software or security components of the Services, Site, or Content (except as and only to the extent any foregoing restriction is prohibited by applicable law or to the extent as may be permitted by any licensing terms accompanying the foregoing). Use of the Site, Content, or Services to violate, tamper with, or circumvent the security of any computer network, software, passwords, encryption codes, technological protection measures, or to otherwise engage in any kind of illegal activity, or to enable others to do so, is expressly prohibited. Apple retains ownership of all its rights in the Site, Content, Apple Events and Services, and except as expressly set forth herein, no other rights or license are granted or to be implied under any Apple intellectual property.¹⁴²

96. The Apple Developer Agreement limits the license that it provides:

This Agreement does not grant [the developer] any right or license to incorporate or make use of any Apple intellectual property (including for example and without limitation, trade secrets, patents, copyrights, trademarks and industrial designs) in any product. Except as expressly set forth herein, no other rights or licenses are granted or to be implied under any Apple intellectual property.¹⁴³

97. In addition to agreement to the terms of the Apple Developer Agreement, before an app developer may access and/or use proprietary Apple software, services, and IP for advanced app development and distribution, such as the beta iOS releases, Metal, and Reality Composer beta

¹⁴¹ “Choosing a Membership,” *Apple*, <https://developer.apple.com/support/compare-memberships/>; Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,757:1-2,759:8.

¹⁴² APL-APPSTORE_10137258-263 at ‘258.

¹⁴³ APL-APPSTORE_10137258-263 at ‘259.

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versions, the app developer must execute the License Agreement.¹⁴⁴ Under the License Agreement, an app developer may obtain a limited license for access and use of a comprehensive suite of developer tools, software and other intellectual property for app creation that Apple has developed and maintains for the Apple Developer Program and the distribution of apps.¹⁴⁵ The terms of the License Agreement provide a “limited license to use the Apple Software and Services provided [under the Apple Developer Program] to develop and test [the member’s] Applications on the terms and conditions set forth in this Agreement,” including those set out in Schedule 1 and Schedule 2 of the License Agreement regarding the distribution of apps.¹⁴⁶

98. The License Agreement includes the following definitions:

- “Apple Software” is defined as “Apple SDKs, iOS, watchOS, tvOS, and/or macOS, the Provisioning Profiles, FPS SDK, FPS Deployment Package, and any other software that Apple provides to [the developer] under the Program, including any Updates thereto (if any) that may be provided to [the developer] by Apple under the Program.”
- “Apple Services” or “Services” is defined as “the developer services that Apple may provide or make available through the Apple Software or as part of the Program for use with [the developer] Covered Products or development, including any Updates thereto (if any) that may be provided to [the developer] by Apple under the Program.”
- “Apple SDKs” is defined as “Apple-proprietary Software Development Kits (SDKs) provided hereunder, including but not limited to header files, APIs, libraries, simulators, and software (source code and object code) labeled as part of iOS, watchOS, tvOS, or Mac SDK and included in the Xcode Developer Tools package for purposes of targeting Apple-branded products running iOS, watchOS, tvOS, or macOS, respectively.”¹⁴⁷

99. The License Agreement specifies: “Applications developed under this Agreement for iOS, WatchOS, or tvOS may be distributed in four ways: (1) through the App Store, if selected by Apple,

¹⁴⁴ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, pp. 4-5.

¹⁴⁵ Trial Transcript, Testimony of Phillip Schiller, May 17, 2021, Trial at 2,759:22-2,760:5, 2,760:22-2,761:14.

¹⁴⁶ APL-APPSTORE_10334884-960 at ‘884; Epic Games, Inc. v. Apple Inc., No. 4:20-cv-05640-YGR (N.D. Cal. Sept., 15, 2020), Dkt. No. 74-2 (Apple Developer Program License Agreement and Schedule 2).

¹⁴⁷ APL-APPSTORE_10334884-960 at ‘885-‘886.

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(2) through the B2B Program, if selected by Apple, (3) through Ad Hoc distribution in accordance with **Section 7.3**, and (4) for beta testing through TestFlight in accordance with **Section 7.4.**¹⁴⁸

100. Pursuant to the “limited, non-exclusive, personal, revocable, non-sublicensable and non-transferable license” provided by the License Agreement, an app developer may, among other things:

- “Install a reasonable number of copies of the Apple Software provided to [the developer] under the Program on Apple-branded products owned or controlled by [the developer], to be used internally by [the developer] or [its] Authorized Developers for the sole purpose of developing or testing Covered Products designed to operate on the applicable Apple-branded products, except as otherwise expressly permitted in this Agreement.”
- Receive access to services, features and functionality provided by Apple for use with a developer account; and
- Access and use Apple Services that may be called through APIs in the Apple Software and/or that Apple may make available through other mechanisms, “only as necessary for providing services and functionality for [] Covered Products that are eligible to use such Services and only as permitted by Apple in writing, including in the Documentation.”¹⁴⁹

101. The License Agreement explicitly limits the rights provided to the app developers. For example, the License Agreement provides: “Apple retains all rights, title, and interest in and to the Apple Software, Services, and any Updates it may make available to [the developer] under this Agreement.”¹⁵⁰ The License Agreement further specifies: “This Agreement does not grant [the developer] any rights to use any trademarks, logos or service marks belonging to Apple, including but not limited to the iPhone or iPod word marks.”¹⁵¹ Developers are required to “retain and reproduce in full the Apple copyright, disclaimers and other proprietary notices (as they appear in the Apple Software and Documentation provided) in all copies of the Apple Software and Documentation that [the developer] [is] permitted to make under this Agreement.”¹⁵² Developers are also required to agree that: “[the developer] may not use the Apple Services in any manner that is inconsistent with the terms of this Agreement or that infringes any intellectual property rights of a

¹⁴⁸ APL-APPSTORE_10334884-960 at ‘915.

¹⁴⁹ APL-APPSTORE_10334884-960 at ‘891-‘892, ‘894.

¹⁵⁰ APL-APPSTORE_10334884-960 at ‘893.

¹⁵¹ APL-APPSTORE_10334884-960 at ‘893.

¹⁵² APL-APPSTORE_10334884-960 at ‘893.

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third party or Apple, or that violates any applicable laws or regulations. [The developer] agree[s] that the Apple Services contain proprietary content, information and material owned by Apple and its licensors, and protected by applicable intellectual property and other laws. [The developer] may not use such proprietary content, information or materials in any way whatsoever, except for the permitted uses of the Apple Services under this Agreement, or as otherwise agreed by Apple in writing.”¹⁵³

102. The License Agreement requires an app developer to agree to various obligations, including:

- Section 3.2(a) – “[The developer] will use the Apple Software and any services only for the purposes and in the manner expressly permitted by this Agreement and in accordance with all applicable laws and regulations;”
- Section 3.2(g) – “Applications for iOS Products....developed using the Apple Software may be distributed only if selected by Apple (in its sole discretion) for distribution via the App Store, B2B Program, for beta distribution through TestFlight, or through Ad Hoc distribution as contemplated in this Agreement;”
- Section 3.3 – “Any Application that will be submitted to the App Store, B2B Program or TestFlight, or that will be distributed through Ad Hoc distribution, must be developed in compliance with the Documentation and the Program Requirements, the current set of which is set forth below in this **Section 3.3**;”
- Section 3.3.1 – “Applications may only use Documented APIs in the manner prescribed by Apple and must not use or call any private APIs;” and
- Section 3.3.25 – “All use of the In-App Purchase API and related services must be in accordance with the terms of this Agreement (including the Program Requirements) and Attachment 2 (Additional Terms for Use of the In-App Purchase API).”¹⁵⁴

103. The License Agreement works in conjunction with various software-specific licenses, such as license agreements that govern each download of Xcode, SDK, or sample code, as well as Apple’s published, publicly-available Guidelines for Using Apple Trademarks and Copyrights (the

¹⁵³ APL-APPSTORE_10334884-960 at ‘894.

¹⁵⁴ APL-APPSTORE_10334884-960 at ‘897, ‘901.

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“Guidelines”).¹⁵⁵ For example, Apple’s published Guidelines specify they “are for Apple licensees, authorized resellers, developers, customers, and other parties wishing to use Apple’s trademarks, service marks or images in promotional, advertising, instructional, or reference materials, or on their web sites, products, labels, or packaging.”¹⁵⁶ Apple limits the use of any Apple mark, specifying: “Except for the limited right to use as expressly permitted under these Guidelines, no other rights of any kind are granted [], by implication or otherwise.”¹⁵⁷ Apple requires: “By using an Apple trademark, in whole or in part, [the developer] [is] acknowledging that Apple is the sole owner of the trademark and promising that [the developer] will not interfere with Apple’s rights in the trademark, including challenging Apple’s use, registration of, or application to register such trademark, alone or in combination with other words, anywhere in the world, and that [the developer] will not harm, misuse, or bring into disrepute any Apple trademark. The goodwill derived from using any part of an Apple trademark exclusively inures to the benefit of and belongs to Apple.”¹⁵⁸

104. Such licenses are commonplace within the app development industry to protect intellectual property. For example, Epic Games offers developers access to the Unreal Engine, an application development platform primarily used for game development. At trial, the Technical Director of Epic Games, Andrew Grant, testified that Epic chooses to license, rather than freely share, access to their Unreal Engine specifically to preserve the value of their Intellectual Property.

Q: Let me ask you this, sir. You understand it to be a license with which those who use the Unreal Engine must comply, correct?

Mr. Grant: Yes.

Q: And that’s because Unreal Engine and the Epic entity that owns it wish to protect and retain their IP rights, correct?

Mr. Grant: Yes.¹⁵⁹

¹⁵⁵ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, pp. 4-5; “Guidelines for Using Apple Trademarks and Copyrights,” *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

¹⁵⁶ “Guidelines for Using Apple Trademarks and Copyrights,” *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

¹⁵⁷ “Guidelines for Using Apple Trademarks and Copyrights,” *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

¹⁵⁸ “Guidelines for Using Apple Trademarks and Copyrights,” *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

¹⁵⁹ Trial Transcript, Testimony of Andrew Grant, May 5, 2021, Trial at 754:13-19.

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105. In addition to broad protections in the License Agreement and the Guidelines, Apple protects its individual software. For example, a license agreement included with Apple's TestFlight 3.1.0 software to beta test apps specifies: “[a]ny installation and/or use of the Apple Software on this device or on [the TestFlight software user's] other supported Apple-branded devices is subject to the terms of this license, unless accompanied by a separate license agreement. If [the TestFlight software user] does not agree to the terms of this license, do not install and/or use the software on this device or on [] other supported Apple-branded devices.”¹⁶⁰ The TestFlight software license grants a “limited, non-transferable, non-exclusive license to install and use the Apple Software on any compatible Apple-branded iOS or tvOS device that [the TestFlight software user] own[s] or control[s] in accordance with the terms of Section 2B.”¹⁶¹ The software license states that the TestFlight software is “licensed, not sold, [] by Apple Inc. (‘Apple’) for use only under the terms of this License. Apple and/or Apple’s licensors retain ownership of the Apple Software itself and reserve all rights not expressly granted.”¹⁶²

106. Apple includes a license reiterating its copyright protection on each set of sample code that is provided through the Apple Developer Program.¹⁶³ For example, the following license is included with sample code available through the App Developer Program for the feature, “Adopting Menus and UIActions in your User Interface”:

¹⁶⁰ TestFlight 3.0.1 License Agreement, available at <https://apps.apple.com/us/app/testflight/id899247664>.

¹⁶¹ TestFlight 3.0.1 License Agreement, available at <https://apps.apple.com/us/app/testflight/id899247664>.

¹⁶² TestFlight 3.0.1 License Agreement, available at <https://apps.apple.com/us/app/testflight/id899247664>.

¹⁶³ For example, downloads from “Menus and Shortcuts,” *Apple*, https://developer.apple.com/documentation/uikit/menus_and_shortcuts.

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**Figure 5: Example Apple License with Copyright¹⁶⁴**

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The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

107. Apple requires app developers to follow the App Store Review Guidelines and App Store Identity Guidelines, both of which are publicly-available.¹⁶⁵ According to Apple, developers must adhere to these Guidelines “to take advantage of both the significant investments Apple has made in the App Store to help them design and build cutting-edge apps, and the services that Apple provides in the marketing and distribution of those apps to consumers.”¹⁶⁶

108. Apple may require additional agreements in certain circumstances. For example, Apple requires entities that intend to develop custom apps for in-house business purposes to enter into an Apple Developer Enterprise Program License Agreement.¹⁶⁷ Where universities offer a course about the development of apps, Apple provides the iOS Developer University Program License

¹⁶⁴ “Guidelines for Using Apple Trademarks and Copyrights,” *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>; “Adopting Menus and UIActions in your User Interface,” *Apple*, https://developer.apple.com/documentation/uikit/menus_and_shortcuts/adopting_menus_and_uiactions_in_your_user_interface.

¹⁶⁵ “App Store Review Guidelines,” *Apple*, <https://developer.apple.com/app-store/review/guidelines/>; “Marketing Resources and Identity Guidelines,” *Apple*, <https://developer.apple.com/app-store/marketing/guidelines/>.

¹⁶⁶ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.’s Opposition to Plaintiff’s Motion for a Preliminary Injunction, September 15, 2020, pp. 5-6.

¹⁶⁷ “Apple Developer Enterprise Program,” *Apple*, <https://developer.apple.com/programs/enterprise/>; “Terms and Conditions,” *Apple*, <https://developer.apple.com/terms/>.

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Agreement and the iOS Developer University Program Student Agreement, to be signed by the university and students, respectively, in order to load and share apps during the course.¹⁶⁸

109. Apple has invested billions of dollars in research and development, including investment in the creation, development, and protection of its iOS ecosystem, App Store, and the tools, technologies, and services that it provides to app developers. As the inventor, author, and IP owner of these technological innovations, Apple has the right to exclusively use and develop apps for its iOS ecosystem and is not required to grant any licenses, or other access, to any of its intellectual property. Apple has chosen to grant access via limited licenses to various aspects of the technology underpinning of the App Store and Apple's tools, such as the technologies and services licensed to app developers for the creation of "great applications for iPhone, iPad, and other Apple products" and as part of its investment in innovating, maintaining, and improving the App Store.¹⁶⁹ Mr. Schiller summarized Apple's commitment:

[T]he App Store is not simply a marketplace—it is part of a larger offering of tools, technologies, and services that Apple makes available to millions of developers to use as they create great applications for iPhone, iPad, and other Apple products. Apple continually innovates and invests to maintain and improve the platform. Apple has made massive investments to develop technologies and features that developers like Epic can use to make great apps (as well as a safe and secure place for users to download these apps). Apple designs its products and services to make developers successful through the use of custom chips, cameras, operating system features, APIs, libraries, compilers, development tools, testing, interface libraries, simulators, security features, developer services, cloud services, and payment systems.¹⁷⁰

110. Developers who wish to submit apps for distribution must pay a nominal fee of \$99 per year to participate in the Apple Developer Program,¹⁷¹ as well as a 30 percent commission on the price of paid apps and any in-app digital content or services.¹⁷² Apple also offers the Apple Developer

¹⁶⁸ "What You Need to Enroll," *Apple*, <https://developer.apple.com/programs/ios/university/enroll/>; "Terms and Conditions," *Apple*, <https://developer.apple.com/terms/>.

¹⁶⁹ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.'s Opposition to Plaintiff's Motion for a Preliminary Injunction, September 15, 2020, p. 27.

¹⁷⁰ Declaration of Philip W. Schiller In Support of Defendant Apple Inc.'s Opposition to Plaintiff's Motion for a Preliminary Injunction, September 15, 2020, p. 27.

¹⁷¹ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,742:17-2,743:7.

¹⁷² Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,761:21-25; Epic Games, Inc. v. Apple Inc., No. 4:20-cv-05640-YGR (N.D. Cal. Sept. 15, 2020), Dkt. No. 74-2 (Apple Developer Program License Agreement and Schedule 2), at Schedule 2, Section 3.4.

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Enterprise Program, which allows large organizations to develop and launch proprietary, internal-use apps to their employees. The Apple Developer Enterprise Program has a \$299 annual fee and is for “specific use cases that require private distribution directly to employees using secure internal systems or through a Mobile Device Management solution.”¹⁷³ However, since 2016, Apple has introduced lower rates for various types of applications and developers. In 2016, Apple implemented a change on subscription fees, whereas after a subscriber’s first year of an auto-renewable subscription, the developer’s subscription fees are reduced from 30 percent to 15 percent.¹⁷⁴ Apple also launched its Video Partner Program in 2016, where premium subscription video providers with applications that integrated with a number of Apple technologies were featured on the Apple TV and only subject to a 15 percent commission instead of the standard 30 percent commission.¹⁷⁵ More recently, on January 1, 2021, Apple launched the App Store Small Business Program, which reduced the App Store commission to 15 percent for small businesses earning up to \$1 million per year. The App Store Small Business Program benefits the vast majority of developers who use the App Store.¹⁷⁶ Apple also does not charge any commission for free applications, “reader” qualified applications, and off-Store sales.¹⁷⁷ Free applications constituted █% of all applications on the App Store in FY2020.¹⁷⁸

111. Developers who participate in the Apple Developer Program receive access to a wide variety of valuable property and services, including a limited license to access and/or use certain Apple software, tools, and other intellectual property; security and privacy support; marketing and technical support; and an integrated mechanism for the delivery of and payment for digital content and services. The “bundle” of IP rights in particular has tremendous value.

¹⁷³ “Apple Developer Enterprise Program,” *Apple Developer*, <https://developer.apple.com/programs/enterprise/>.

¹⁷⁴ “Apple announces it will offer App Store subscriptions to all apps, take smaller 15% cut,” *AppleInsider*, June 8, 2016, <https://appleinsider.com/articles/16/06/08/apple-announces-it-will-offer-app-store-subscriptions-take-smaller-15-cut>.

¹⁷⁵ “Apple Video Partner Program,” *Apple Developer*, <https://developer.apple.com/programs/video-partner/>.

¹⁷⁶ “Apple announces App Store Small Business Program,” *Apple*, <https://www.apple.com/newsroom/2020/11/apple-announces-app-store-small-business-program/>; Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,859:23.

¹⁷⁷ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,858:18-20, 3,861:15-18; “App Store Review Guidelines,” *Apple*, <https://developer.apple.com/app-store/review/guidelines/#other-purchase-methods>.

¹⁷⁸ Expert Report of Lorin Hitt, August 10, 2021, ¶48.

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8. APPLE'S INTELLECTUAL PROPERTY

8.1. Introduction to Apple's Intellectual Property

112. “Apple’s innovation is embodied in its intellectual property, including patents, trademarks, and copyrights.”¹⁷⁹ Apple’s intellectual property also includes other forms of intellectual property, such as trade secrets, that relate to aspects of Apple’s “hardware devices, accessories, software and services.”¹⁸⁰ Consistent with its investment of over \$100 billion in research and development from Apple’s FY 2005 through its FY 2020,¹⁸¹ Apple has a focus on innovation:

Innovation is the cornerstone of Apple’s business and the company prides itself on the commitment to ‘think different,’ inventing products and services unlike anything else on the market. With products such as the Mac, iPod, iPhone, iPad, and Apple Watch, Apple has revolutionized industries, and created entirely new industries by reimagining technology and focusing on delivering the best possible user experience.¹⁸²

113. Further, Apple “believes the ownership of such intellectual property rights is an important factor in its business and that its success does depend in part on such ownership;” Apple “relies primarily on the innovative skills, technical competence and marketing abilities of its personnel.”¹⁸³

114. Apple has discussed at length its intellectual property in (1) the hardware and software used by consumers and (2) the tools and services it provides to developers which enable them to create apps for consumers. For example:

- Tim Cook stated in his deposition, “We pride ourselves in intellectual property. We put a lot of our personal energy and our investment into R&D to innovate.” Regarding how consumers benefit, Cook said that “the thing that people love about Apple is the integration of hardware, software, and services and that things just work together.” He goes on to state

¹⁷⁹ “Intellectual Property,” *Apple*, <https://www.apple.com/legal/intellectual-property/>.

¹⁸⁰ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 3.

¹⁸¹ Schedule 6.0.

¹⁸² “A Statement on FRAND Licensing of SEPs,” *Apple*, <https://www.apple.com/legal/intellectual-property/frand/>.

¹⁸³ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 3.

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that “[t]he integration of hardware and software and the services element are key to having the customer experience be this sort of delightful experience.”¹⁸⁴

- In Tim Cook’s trial testimony in the Epic matter, he stated, “We do a number of things. We invest like crazy in R&D. We’ve invested a hundred billion dollars since – since the start of the iPhone development, and – and that number is just accelerated. In fact, we’ve invested 50 billion in the last three years. In addition to that, we have a maniacal focus on the user, in doing the right thing by the customer. We integrate hardware, software, and services, and we think that we do that better than anyone else. We take a lot of the complexity of technology away from the user and make things simple, not complex.”¹⁸⁵

115. This is not a recent development. Apple has indicated the importance of its intellectual property in the iPhone and the iOS ecosystem since the introduction of the first iPhone. At the MacWorld Conference on January 9, 2007, Steve Jobs, Apple’s then chairman, CEO, and co-founder, emphasized Apple’s patent protection over the iPhone and its features.¹⁸⁶ He explained that the iPhone offered benefits from the combination of innovations in the hardware, software, and applications. While describing various revolutionary features of the iPhone, Mr. Jobs noted that the following were patented:

- Access to many features and apps due to its operating system (renamed as iOS in June 2010);¹⁸⁷
- “Desktop” features with applications and networking;
- Access to a variety of apps;
- A camera; and

¹⁸⁴ Timothy Cook, Deposition, February 12, 2021, p. 139:14-17.

¹⁸⁵ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,845:11-21.

¹⁸⁶ “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 7:35, <https://www.youtube.com/watch?v=x7qPAY9jqE4>.

¹⁸⁷ Apple announced the change in name of the operating system for the iPhone during the 2010 WWDC Keynote. “Live Update: 2010 WWDC Keynote,” *Macworld*, <https://www.macworld.com/article/1151730/liveupdate.html?page=2>.

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- The use of a novel touch screen and human interface that facilitated changing access to new features and functions not possible with the physical keyboards of most widely available smartphones in 2007.¹⁸⁸

Figure 6: Steve Jobs Introduces the “Patented!” iPhone¹⁸⁹



116. Mr. Jobs emphasized the innovative nature of Apple's software, as well as its interplay with the rest of the IP and technology in Apple's ecosystem, in 2008, during an interview with the *Wall Street Journal* at the launch of the App Store:

Well, our theory on iPhone is that phone differentiation used to be about radios and antenna and things like that. We think going forward, the phone of the future will be differentiated by software.

¹⁸⁸ “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 8:13, <https://www.youtube.com/watch?v=x7qPAY9jqE4>.

¹⁸⁹ “Steve Jobs Introducing the iPhone at MacWorld 2007,” *YouTube*, December 2, 2010, at 7:35, <https://www.youtube.com/watch?v=x7qPAY9jqE4>.

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That was our theory going into this market, that we were reasonably good at creating innovative software and that we could leverage a tremendous amount of software that we've been working on for the last decade and actually put it in a mobile device.

The core OS X, a UNIX operating system, all the graphics know-how, all the communications know-how, all the email know-how, and just all that, all the user interface know-how, we could bring that to bear on a phone.

The App Store is just one more example of software. It's just like the iPod. It's software on the device. It's software in the cloud, in the backend service. So to compete with it, one needs a platform that's capable of writing really good software.

Then one needs to be able to put together a whole system with a backend cloud, App Store, and the client, but then also sell developers that the phone itself has good enough software that's worth writing apps on.¹⁹⁰

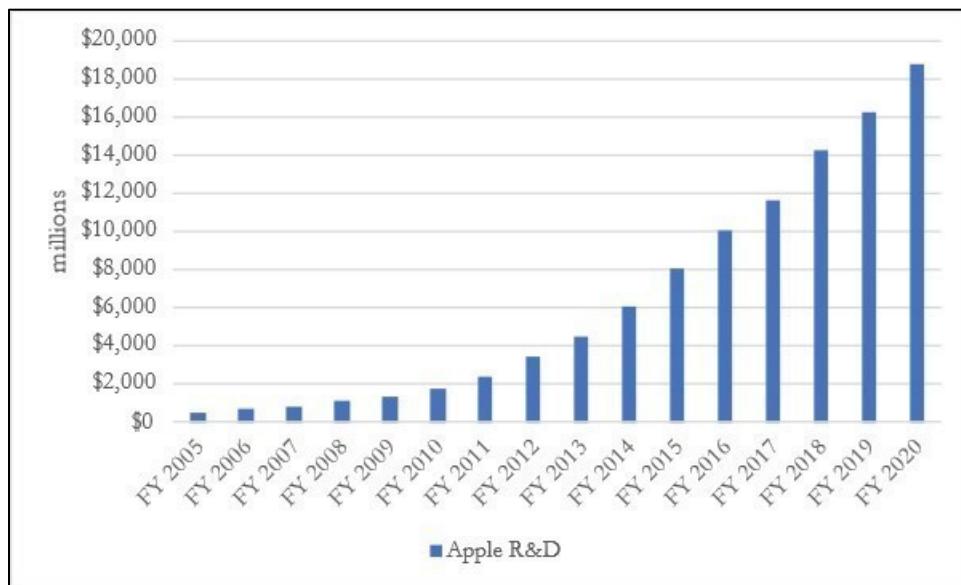
117. Apple's commitment to research and development has grown over time. Since Apple's FY 2005, when Apple began working in earnest on the iPhone, the Company's annual research and development expenditures have grown from approximately \$0.5 billion to almost \$18.8 billion in FY 2020, for a combined total of more than \$101 billion over this period.

¹⁹⁰ "The Mobile Industry's Never Seen Anything Like This: An Interview with Steve Jobs at the App Store's Launch," *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industry-s-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>.

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Figure 7: Apple Research and Development Expenditures FY 2005 – FY 2020¹⁹¹



118. Apple “regularly files patent applications to protect innovations arising from its research, development and design.”¹⁹² Apple’s patent portfolio, reflecting its research and development investment, has grown significantly over time.

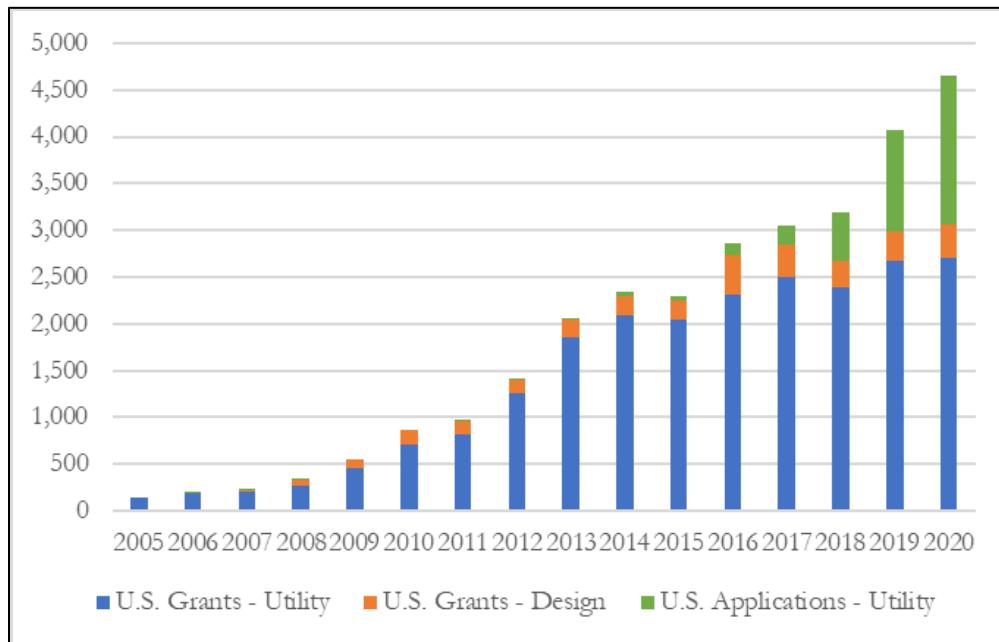
¹⁹¹ Schedule 6.0.

¹⁹² Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 3.

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Figure 8: Apple Granted U.S. Patents and Applications 2005 – 2020¹⁹³



119. As of approximately the date of this declaration, Apple has 24,096 issued U.S. utility patents and 3,157 issued U.S. design patents.¹⁹⁴ In addition, Apple has 3,754 filed applications for U.S. patents that have not yet matured into issued patents.¹⁹⁵ According to WIPO, Mr. Jobs alone held 317 utility and design U.S. patents, many of which are patents protecting iconic Apple products including iOS-based devices, as well as keyboards, mice, and power adaptors.¹⁹⁶

¹⁹³ Schedule 1.1; Schedule 1.2; Schedule 1.3.

¹⁹⁴ Schedule 1.0.

¹⁹⁵ Schedule 1.0.

¹⁹⁶ “The Patents and Trademarks of Steve Jobs: Art and Technology that Changed the World,” WIPO, https://www.wipo.int/export/sites/www/pressroom/en/documents/steve_jobs_brochure_2012.pdf, p. 2.

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**Figure 9: U.S. Apple Patents and Applications¹⁹⁷**

U.S. Active and Granted		
Utility	Design	Total
24,096	3,157	27,253
U.S. Applications		
Utility	Design	Total
3,754	-	3,754

120. Apple has invested substantially in protecting its intellectual property rights in its iOS ecosystem. For example, Apple holds 1,237 issued U.S. patents referencing iOS and an additional 559 U.S. patent applications referencing iOS.¹⁹⁸

121. Apple holds approximately 165 U.S. patents and 91 U.S. patent applications referencing technology in and relating to Apple's App Store.¹⁹⁹ Based on a non-exhaustive search of Apple's patents (described further in Section 8.4.2), Apple holds patents covering App Store-related areas such as:

- 31 U.S. patents and 15 U.S. patent applications referring to comprehensive development tools like Apple's Xcode IDE that allow developers to design, build, and train apps and produce content for AR experiences;²⁰⁰

¹⁹⁷ Schedule 1.0.

¹⁹⁸ Schedule 4.0.

¹⁹⁹ Schedule 3.1.

²⁰⁰ Schedule 4.1.

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- 86 U.S. patents and 22 U.S. patent applications referring to frameworks and related services such as CloudKit, HomeKit, UIKit, and WebKit directed towards the infrastructure of iOS apps and their use of data and web content;²⁰¹ and
- 112 U.S. patents and 22 U.S. patent applications referring to technology that allows developers to focus on designing and building apps that can facilitate the development of advanced user interactions and features, such as CoreAudio, CoreGraphics, CoreVideo, and in-app purchases.²⁰²

122. Apple spends billions to develop and secure these patents and uses its App Store framework to provide developers access. Developers leverage these patents, as well as other Apple intellectual property protecting Apple's libraries, services, and frameworks, to develop applications for Apple's iOS platform.

123. Apple employs copyright protection to protect its original content. The Company places its copyright on its software, documentation and source code,²⁰³ in addition to holding over 5,000 registered U.S. copyrights relating to aspects of its products and services, including hundreds of iOS-specific copyrights.²⁰⁴ Apple reinforces that copyright protection through its use of licenses.²⁰⁵ For example, Apple requires all users of iPhones (as well as iPads and iPod Touches) to accept and agree to be bound by the terms of an "iOS and iPadOS Software License Agreement."²⁰⁶ Such license agreements specify that "Apple and its licensors retain ownership of the Apple Software itself and reserve all rights not expressly granted."²⁰⁷ Apple similarly requires other users of its intellectual property, such as app developers, to enter into license agreements: the Apple Developer Agreement, Apple Developer Program License Agreement, and individual software licenses. For example, when providing sample source code, Apple includes a license that reiterates its copyright protection of such code and associated documentation and requires that the copyright notice be included in all

²⁰¹ Schedule 4.2.

²⁰² Schedule 4.3.

²⁰³ "Guidelines for Using Apple Trademarks and Copyrights," *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>; for example, downloads of the following code: "Adopting Menus and UIActions in your User Interface," *Apple*, https://developer.apple.com/documentation/uikit/menus_and_shortcuts/adopting_menus_and_uiactions_in_your_user_interface; "Sample Code," *Apple*, <https://developer.apple.com/wwdc20/sample-code/>.

²⁰⁴ Schedule 2.0.

²⁰⁵ "Software License Agreements," *Apple*, <https://www.apple.com/legal/sla/>.

²⁰⁶ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf.

²⁰⁷ "iOS and iPadOS Software License Agreement," *Apple*, https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf, at Section 1(a), 2(e).

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copies or substantial portions of that code and documentation.²⁰⁸ Apple has registered copyrights of content encompassed within the iOS ecosystem.

124. Apple protects its IP rights with trademarks, service marks, trade names, and trade dress as valuable assets. A non-exhaustive list of Apple's registered trademarks appears on its website.²⁰⁹ For example, Apple has invested in obtaining trademark protection of terms relating to the App Store and software tools used by app developers such as:²¹⁰

- App Store®;
- CloudKit®;
- iAd®;
- Swift®;
- Swift Playgrounds®; and
- SwiftUI™.

125. In 2011, Apple described its investment in the "App Store" mark and service when it filed suit to enforce that mark:

Apple has extensively advertised, marketed, and promoted the APP STORE service and the APP STORE mark, spending millions of dollars on print, television, and internet advertising. News outlets have also commented extensively and repeatedly on the operations of the APP STORE service in the months and years following its launch. The enormous public attention given the APP STORE service, and the success of the service, have cemented the public's identification of APP STORE as a trademark for Apple's service. Moreover, Apple has obtained registrations of the APP STORE mark covering more than fifty foreign jurisdictions, including the European Union, Japan, and China.²¹¹

²⁰⁸ "Sample Code," *Apple*, <https://developer.apple.com/wwdc20/sample-code/>.

²⁰⁹ "Apple Trademark List," *Apple*, <https://www.apple.com/legal/intellectual-property/trademark/appletmplist.html>.

²¹⁰ "Apple Trademark List," *Apple*, <https://www.apple.com/legal/intellectual-property/trademark/appletmplist.html>.

²¹¹ Complaint, *Apple Inc. v. Amazon.com, Inc.*, Case No. 4:11-cv-01327-PJH, March 18, 2011, ¶14.

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126. Apple states that its marks must be used pursuant to its published, publicly available Guidelines for Using Apple Trademarks and Copyrights, unless otherwise licensed in a separate agreement.²¹² In the Guidelines, Apple states:

By using an Apple trademark, in whole or in part, you are acknowledging that Apple is the sole owner of the trademark and promising that you will not interfere with Apple's rights in the trademark, including challenging Apple's use, registration of, or application to register such trademark, alone or in combination with other words, anywhere in the world, and that you will not harm, misuse, or bring into disrepute any Apple trademark. The goodwill derived from using any part of an Apple trademark exclusively inures to the benefit of and belongs to Apple. Except for the limited right to use as expressly permitted under these Guidelines, no other rights of any kind are granted hereunder, by implication or otherwise.²¹³

127. Unlike competitors such as Google and Microsoft, who have licensed their operating systems for use on devices manufactured by other original equipment manufacturers, including but not limited to Samsung, Motorola, Nokia, and Oppo,²¹⁴ Apple does not and has not licensed iOS, nor other of its operating systems, such as macOS, to other original equipment manufacturers; iOS is available only on Apple devices.²¹⁵ Apple has chosen to reserve and exercise its right to exclusively use its intellectual property for the design and production of its own devices.

8.2. Protection of Apple Technology through Intellectual Property

128. Apple's commitment to protecting its IP rights is shown by, among other demonstrations, its enforcement efforts in courts and before regulatory agencies. For example, in the early 2010s, Apple filed multiple suits around the world against Samsung Electronics Co., Ltd., Samsung Electronics America, Inc. and Samsung Telecommunications America, LLC (collectively, "Samsung")²¹⁶ in an effort to protect the "revolutionary patented design and user experience of [its iconic iPhone and iPad devices] ... [that have] result[ed] [from] Apple's massive investment in

²¹² "Guidelines for Using Apple Trademarks and Copyrights," *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

²¹³ "Guidelines for Using Apple Trademarks and Copyrights," *Apple*, <https://www.apple.com/legal/intellectual-property/guidelinesfor3rdparties.html>.

²¹⁴ "Phones & Tablets," *Android*, <https://www.android.com/phones-tablets/>.

²¹⁵ "Apple," *Apple*, <https://www.apple.com>; *Apple Inc. v. Pystar Corp.*, 673 F. Supp. 2d 931 (N.D. Cal. Nov. 13, 2009), aff'd *Apple Inc. v. Pystar Corp.*, 658 F. 3d 1150, 1152 (9th Cir. 2011).

²¹⁶ "Every Place Samsung and Apple are Suing Each Other," *PCMag*, September 14, 2011, <https://www.pc当地/archive/every-place-samsung-and-apple-are-suing-each-other-287700>.

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innovation.”²¹⁷ As Apple explained in its Complaint, Apple sought to protect its technology in light of what it perceived as Samsung’s “systematic[] cop[ying] [of] Apple’s innovative technology and products, features, and designs.”²¹⁸

129. In another court action, Apple sought to protect its software through copyright infringement litigation. Apple filed suit against Psystar Corp. (“Psystar”) after Psystar reproduced, modified and distributed Apple’s Mac OS X operating system software on non-Apple computers, in violation of the Software License Agreements covering Mac OS X.²¹⁹ Apple’s Mac OS X Software License Agreement had provided that the Mac OS X “software [was] licensed, not sold to [the user] by Apple Inc. (‘Apple’) for use only under the terms of this License.”²²⁰ Apple’s license agreements restricted the use of Mac OS X to Apple computers, and specifically prohibited customers from installing the operating system on non-Apple computers.²²¹ The Ninth Circuit affirmed that Apple’s Software License Agreement for Mac OS X permissibly “require[d] the [Mac OS X] operating system to be used on the computer it was designed to operate … [and] w[as] thus appropriately used to prevent infringement and control use of the copyrighted material.”²²²

130. Apple has sought to enforce its marks through trademark litigation. For example, it filed litigation against Amazon.com claiming that Apple’s APP STORE mark was infringed by Amazon’s “Appstore Developer Portal” and “Appstore Developer Program.”²²³

131. Apple has provided notifications to third parties using its marks improperly. For example, Apple explained in its Complaint in the *Amazon.com* litigation:

In limited instances, third parties have made improper use of the term APP STORE. In response, Apple has contacted those parties and requested that they cease and desist from further use of the mark. In almost every instance, the entities contacted by Apple agreed to cease use of Apple’s APP STORE mark.²²⁴

²¹⁷ Complaint, *Apple v. Samsung*, Case No. 5:12-cv-630-LHK, ¶1.

²¹⁸ Complaint, *Apple v. Samsung*, Case No. 5:12-cv-630-LHK, ¶2.

²¹⁹ *Apple Inc. v. Psystar Corp.*, 673 F. Supp. 2d 931 (N.D. Cal. Nov. 13, 2009), aff’d *Apple Inc. v. Psystar Corp.*, 658 F. 3d 1150, 1152 (9th Cir. 2011).

²²⁰ *Apple Inc. v. Psystar Corp.*, 673 F. Supp. 2d 931, 933 (N.D. Cal. Nov. 13, 2009) (internal citations omitted), aff’d *Apple Inc. v. Psystar Corp.*, 658 F. 3d 1150, 1152 (9th Cir. 2011).

²²¹ *Apple Inc. v. Psystar Corp.*, 658 F. 3d 1150, 1155 (9th Cir. 2011).

²²² Complaint, *Apple Inc. v. Amazon.com, Inc.*, Case No. 4:11-cv-01327-PJH, March 18, 2011, ¶25.

²²³ Complaint, *Apple Inc. v. Amazon.com, Inc.*, Case No. 4:11-cv-01327-PJH, March 18, 2011, ¶20.

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132. Apple demonstrated its commitment to protecting its copyrights in testimony before the Copyright Office. In 2009, Apple addressed the harm to its IP that was posed by “jailbreaking,” or software that would “break,” or circumvent, technological protection measures surrounding the firmware contained on its iPhones.²²⁴ As Apple explained in its Responsive Comment to the U.S. Copyright Office in the matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies:

Apple is opposed to [jailbreaking software] because it will destroy the technological protection of Apple’s key copyrighted computer programs in the iPhone™ device itself and of copyrighted content owned by Apple that plays on the iPhone, resulting in copyright infringement, potential damage to the device and other potential harmful physical effects, adverse effects on the functioning of the device, and breach of contract.²²⁵

133. Apple explained to the Copyright Office that its technological protection measures (“TPMs”) protect the copyright interests at the heart of Apple’s creation of the iPhone:²²⁶

These TPMs do more, however, than simply help ensure the quality of the customer’s experience with iPhone applications. They also protect Apple’s copyright interests in its own content, as well as the copyright interests of third parties in their content, that plays on the iPhone. There are many instances in which unauthorized persons “strip” the TPMs protecting such content, thereby placing it “in the clear” (*i.e.*, in unprotected form). With the TPM removed, pirated copies of the content in unprotected form can then be widely distributed among persons who do not pay for it, typically through unlawful peer-to-peer networks and other online distribution sites. Such has happened, for example, to a copyrighted game owned by Apple called “Texas Hold ‘Em,” as well as to a host of popular games from third party vendors. However, the stripped games can be played only on jailbroken iPhones, because the TPMs on the iPhone would otherwise prevent them from playing. Apple believes that the proposed exemption would further facilitate and encourage

²²⁴ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 2.

²²⁵ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 2.

²²⁶ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 10.

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this form of piracy. Piracy, in turn, can diminish the investment that developers are willing to make in the creation of copyrighted works for the iPhone, contrary to the fundamental purpose of the copyright law to encourage the creation of new works of authorship.²²⁷

134. Apple's copyright interests can be threatened by at least the following risks and harms arising from, for example, jailbreaking software:

- Crashes & instability;
- Malfunctioning & safety;
- Invasion of privacy;
- Exposing children to age-inappropriate content;
- Viruses & malware;
- Inability to update software;
- Cellular network impact;
- Piracy of developers' applications;
- Instability of developers' applications;
- Increased support burden;
- Harm to Apple's developer relationships;
- Harm to the Apple/iPhone brand; and
- Limitation on ability to innovate.²²⁸

²²⁷ Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, pp. 9-10.

²²⁸ Response of Apple Inc. to Questions Submitted by the Copyright Office Concerning Exemptions 5A and 11A (Class #1), In the matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, Docket No. RM 2008-8,

https://www.wired.com/images_blogs/threatlevel/2009/07/applejailbreakresponse.pdf, p. 14; Responsive Comment of Apple Inc. In Opposition to Proposed Exemptions 5A and 11A (Class #1), *In the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies*, Docket No. RM 2008-8, https://www.wired.com/images_blogs/threatlevel/2009/05/apple.pdf, p. 14.

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135. The Ninth Circuit has recognized that Apple could suffer harm as a result of copyright infringement. The *Psystar* court held that “[w]ith respect to its brand, business reputation, and goodwill, Apple has put forth significant evidence, undisputed by Psystar, that its investment in and commitment to high standards of quality control and customer service would be irreparably harmed if Psystar’s illegal [infringement] activities were allowed to continue.”²²⁹

136. In addition to the recited examples of Apple’s protection and enforcement efforts, Apple has invested in efforts to identify and eliminate leaks of its software and hardware technology. Examples of the results of Apple’s investments in these efforts include:

- The 2017 arrest of twelve individuals caught leaking Apple’s proprietary information;²³⁰
- The identification of an employee who leaked a link to the gold master of iOS 11 to the press as well as employees who fed confidential details about new products, such as the iPhone X, iPad Pro and AirPods, to a blogger at 9to5Mac;²³¹ and
- The issuance of warning letters to popular online leakers of Apple information, including one to Chinese leaker “Kang” in June of 2021.²³²

137. Apple has worked with its suppliers to prevent theft of Apple’s intellectual property by, for example, identifying physical and technical vulnerabilities and improving security levels in its facilities and throughout the supply chain.²³³ Apple has explained the impact of leaks:

Leaking Apple’s work undermines everyone at Apple and the years they’ve invested in creating Apple products. “Thousands of people work tirelessly for months to deliver each major software release,” says UIKit lead Josh Shaffer, whose team’s

²²⁹ *Apple Inc. v. Psystar Corp.*, 673 F. Supp. 2d. 943, 948-49 (N.D. Cal. 2009), aff’d *Apple Inc. v. Psystar Corp.*, 658 F. 3d 1150, 1152 (9th Cir. 2011).

²³⁰ “Apple Warns Employees to Stop Leaking Information to Media,” *Bloomberg*, April 13, 2018, <https://www.bloomberg.com/news/articles/2018-04-13/apple-warns-employees-to-stop-leaking-information-to-media>.

²³¹ “Apple Warns Employees to Stop Leaking Information to Media,” *Bloomberg*, April 13, 2018 <https://www.bloomberg.com/news/articles/2018-04-13/apple-warns-employees-to-stop-leaking-information-to-media>.

²³² “Apple reportedly sends warning letter to Chinese leaker,” Richard Lawler, *The Verge*, June 25, 2021, <https://www.theverge.com/2021/6/25/22551182/kang-letter-apple-leak-warning-iphone-12>.

²³³ “Apple Warns Employees to Stop Leaking Information to Media,” *Bloomberg*, April 13, 2018 <https://www.bloomberg.com/news/articles/2018-04-13/apple-warns-employees-to-stop-leaking-information-to-media>.

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work was part of the iOS 11 leak last fall. “Seeing it leak is devastating for all of us.”²³⁴

8.3. Third-Party Recognition of the Importance of Apple’s Intellectual Property

138. Apple’s intellectual property has been tracked and valued by various third-party entities. For example, ktMINE, an IP-focused research group, observed that by 2018, Apple had nearly 1,000 registered U.S. trademarks and over 350 marks that were filed but not registered. It also noted an upward trend in Apple patent applications and grants over the past 20 years. ktMINE suggested that Apple’s protection of its intellectual property could be traced to Mr. Jobs’ “determination in 2006 to protect the iPhone before its first release.”²³⁵ ktMINE concluded that, “Apple’s extensive patent portfolio reveals certain trends in research and development, but also indicates the company’s intent to use its IP as a tool to prevent competitors from either copying existing technologies or bringing Apple’s ‘original’ ideas to fruition first.”²³⁶

139. Gene Quinn, the president and founder of IPWatchdog, one of the leading sources for news, information, analysis and commentary in the patent and innovation industries, noted that Apple’s IP strategy is one of the keys to its continued success and a driver of innovation within the company.²³⁷ “Detractors of the patent system are always quick to point out that it is their belief that patents do not contribute to innovation. It is, however, extremely difficult to argue that Apple products are not innovative … the fact that Apple is so aggressive with its patent portfolio demonstrates that patents can and do lead innovative companies to succeed.”²³⁸

140. A leading treatise on the valuation of intellectual property noted that, “Apple has an enormous amount of intellectual property and intangible assets not the least of which are patented

²³⁴ “Apple means business when protecting intellectual property,” *CFO*, <https://www.csoonline.com/article/3269868/apple-means-business-when-protecting-intellectual-property.html>.

²³⁵ “Exploring Intellectual Property at Apple: A study of Strategy and Patterns,” ktMINE, July 25, 2018, <https://www.ktmine.com/exploring-intellectual-property-at-apple-a-study-of-strategy-and-patterns/>.

²³⁶ “Exploring Intellectual Property at Apple: A study of Strategy and Patterns,” ktMINE, July 25, 2018, <https://www.ktmine.com/exploring-intellectual-property-at-apple-a-study-of-strategy-and-patterns/>.

²³⁷ “Welcome to IPWatchdog.com, Celebrating 20 Years,” <https://www.ipwatchdog.com/about/>; “The Apple Way: Repeated Innovation + Patent = Domination,” IPWatchdog, January 24, 2010, <https://www.ipwatchdog.com/2010/01/24/the-apple-way-repeated-innovation-patent-domination-2/id=8589/>.

²³⁸ “The Apple Way: Repeated Innovation + Patent = Domination,” IPWatchdog, January 24, 2010, <https://www.ipwatchdog.com/2010/01/24/the-apple-way-repeated-innovation-patent-domination-2/id=8589/>.

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technology and its iconic name Apple.”²³⁹ The book estimated the value of Apple’s intangible assets, including intellectual property assets, to be over sixty percent of Apple’s business enterprise value.²⁴⁰

141. The significance of Apple’s IP garners its own attention and has resulted in the creation of at least one dedicated website: [patentlyapple.com](http://www.patentlyapple.com), which tracks and provides regular updates regarding Apple’s granted patents, patent applications, continuation patents and design patents, as well as trademarks. Patentlyapple.com also covers IP-related Apple litigation as well as certain activity relating to Apple competitors.²⁴¹

142. The value of Apple’s IP is reinforced by third-party analyses of the value of Apple’s brand. Apple is consistently recognized as having one of the most valuable, if not the most valuable, brands in the world. For example, in its 2021 report on the most valuable and strongest American brands, Brand Finance identified Apple has having the world’s most valuable brand, with a \$263.4 billion valuation.²⁴² According to Brand Finance:

Under Tim Cook’s leadership, especially over the past five years, Apple began to focus on developing its growth strategies above and beyond the iPhone – which in 2020 accounted for half of sales versus two-thirds in 2015. The diversification policy has seen the brand expand into digital and subscription services, including the App Store, iCloud, Apple Podcasts, Apple Music, Apple TV, and Apple Arcade. On New Year’s Day alone, App Store customers spent \$540 million on digital goods and services.²⁴³

²³⁹ Russell L. Parr, *Intellectual Property, Valuation, Exploitation, and Infringement Damages*, Fifth Edition, 2018, p. 500.

²⁴⁰ Russell L. Parr, *Intellectual Property, Valuation, Exploitation, and Infringement Damages*, Fifth Edition, 2018, p. 500.

²⁴¹ “About/Contact Us,” *Patently Apple*, <https://www.patentlyapple.com/patently-apple/contact-us.html>.

²⁴² “US 500 2021: The Annual Report on the Most Valuable and Strongest American Brands,” *Brand Finance*, January 2021, p. 9.

²⁴³ “US 500 2021: The Annual Report on the Most Valuable and Strongest American Brands,” *Brand Finance*, January 2021, p. 12.

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8.4. Apple's Intellectual Property Related to its App Store

143. Apple maintains intellectual property protections related to the App Store and developer tools. Like the multilayered approach to protect user privacy, Apple has invested in the development of a multilayered set of protections for its App Store technology, including patents and trade secrets as well as copyrights and trademarks.²⁴⁴

144. iOS and iPhone features, software tools, and app developer services have been the subject of ongoing innovation since Apple began its iPhone development prior to initial launch in 2007. The number of public iOS APIs made available by Apple to app developers has grown from 10,000 to 150,000 since Apple's first SDK was released in 2008.²⁴⁵ Apple has continued to add and update features in new versions of its software development kits, including new APIs, new versions of Xcode and performance monitoring tools, and new developer support documentation.²⁴⁶

8.4.1. Use of iOS and App Store Related IP by Developers

145. Apple has discussed at length its intellectual property in the tools and services it provides to the Developer Plaintiffs and that the Developer Agreement and License Agreement, at least in part, protect Apple's intellectual property against unauthorized and uncompensated use. For example:

- Philip Schiller stated in his deposition, "from my perspective, [the] majority of engineering Apple does is to support and benefit app developers, whether it is new hardware features that developers will take advantage of, new software features in the operating systems and in the APIs we developed, and the capabilities of the store to distribute, support their apps."²⁴⁷
- Philip Schiller, in his trial testimony, had the following exchange regarding Apple's IP related to SDKs and the significant development effort required on the part of Apple:

Q: And what is a Software Development Kit?

Mr. Schiller: It includes a number of resources for developers to write software, resources like the APIs that we have been talking about, developer tools like Xcode. It includes

²⁴⁴ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 3; Section 8.4.2.

²⁴⁵ Trial Transcript, Testimony of Philip W. Schiller, May 17, 2021, Trial at 2,894:15-22.

²⁴⁶ Trial Transcript, Testimony of Philip Schiller, May 17, 2021, Trial at 2,894:23-2,895:14.

²⁴⁷ Philip Schiller, Deposition, February 11, 2021, p. 91:18-24.

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documentation to help understand the APIs and their functions. Often has sample code to help a developer start to write their application or learn how to use an API.

Q: And do the Software Development Kits – are they made up of Apple's intellectual property?

Mr. Schiller: Yes.

Q: In terms of this initial SDK [development], how significant an effort was that?

Mr. Schiller: Tremendous.

Q: Can you describe that a bit, please.

Mr. Schiller: For the better part of a year, the entire software organization was working to create and document the APIs as well as make the tools work with these new APIs on this new platform for developers.²⁴⁸

146. Developers have acknowledged the advanced set of capabilities in, and ease of use of, Apple's tools since Apple first announced the iPhone SDK for app developers in 2008.²⁴⁹ During the launch event for Apple's SDK, developers demonstrated their use of Apple's APIs and other developer tools, including Sega's *Super Monkey Ball* game app, Electronic Arts' *Spore: Origins* game app, AOL's *AIM for the iPhone* social instant messaging app, among others.²⁵⁰ These developers demonstrated apps they built merely "in two weeks on an SDK that they'd never seen before;" Electronic Art's *Spore* app "took advantage of a lot of the different features of the [iPhone]," Sega's "full 3D demo of the game [*Super Monkey Ball*] ... [was created] working with a terrific, flexible, and powerful SDK," and AOL's "*AIM for the iPhone*" social instant messaging app was built after coming "with absolutely no code for the device, just a spec sheet of how to talk to AIM."²⁵¹

²⁴⁸ Trial Transcript, Testimony of Phillip Schiller, May 17, 2021, Trial at 2,731:24-2,732:8, 2,732:17-24.

²⁴⁹ APL-APPSTORE_0000055-87 at '68, '71, '73, '74.

²⁵⁰ APL-APPSTORE_0000055-87 at '68-'69, '73.

²⁵¹ APL-APPSTORE_0000055-APL-87 at '68-'69, '71, '73.

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147. The initially available APIs provided a suite of tools that permitted use of iPhone's multimedia hardware and software to create "not a cellphone game ... [but] a full console game."²⁵² The app developers at Apple's 2008 event highlighted the ease of using the iPhone's Cocoa Touch, the application development environment, which leveraged a novel touchscreen user interface.²⁵³ Electronic Arts explained: "it took us about two days to get Cocoa Touch up and running. Once we had that up and running, we were then able to bring in our entire game development and got the whole game up and running."²⁵⁴ As Scott Forstall, former Apple Senior Vice President of iPhone Software,²⁵⁵ explained at Apple's launch event, "Cocoa Touch is built all around the concept of touch as an input so [Apple and app developers] start with an advanced multi-touch event system. This handles everything from a single finger touch to multi-finger to gestures. On top of this event system we built our multi-touch controls so our controls know all about the multi-touch nature of the iPhone."²⁵⁶

Figure 10: Scott Forstall Introduced Cocoa Touch with SDK in 2008²⁵⁷



²⁵² APL-APPSTORE_00000055-87 at '74.

²⁵³ "2008 03 06 Apple March 6 Event, iPhone Software Roadmap," *YouTube*, November 4, 2016, at 47:25, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

²⁵⁴ APL-APPSTORE_00000055-87 at '69.

²⁵⁵ Scott Forstall, https://academic2.ru/Scott%20Forstall_6908858.

²⁵⁶ APL-APPSTORE_00000055-87 at '63-'64.

²⁵⁷ "2008 03 06 Apple March 6 Event, iPhone Software Roadmap," *YouTube*, November 4, 2016, at 26:35, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

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148. Electronic Arts' *Spore* app leveraged the touch interface to "allow [the user] to customize the game in two different ways" – adding game play features to the spore game protagonist and creative personalization in changing the look of the spore.²⁵⁸

Figure 11: *Spore* App – 2008²⁵⁹



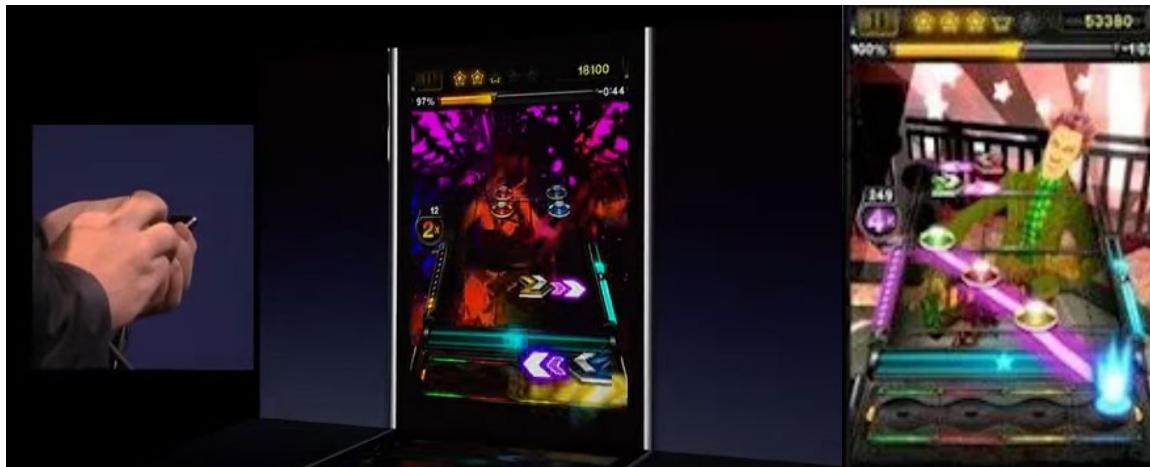
149. In 2010, Activision used advances in Apple's multi-touch API technology to build a *Guitar Hero* app that integrated different types of movement such as tapping, sustained touches, and "slide jams" to "deliver a richer guitar experience."²⁶⁰

²⁵⁸ APL-APPSTORE_00000055-87 at '69.

²⁵⁹ "2008 03 06 Apple March 6 Event, iPhone Software Roadmap," *YouTube*, November 4, 2016, at 47:48, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

²⁶⁰ "Apple WWDC 2010," *YouTube*, December 31, 2011, at 23:57, <https://www.youtube.com/watch?v=ldFx1ftxs0A>.

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Figure 12: *Guitar Hero* App – 2010²⁶¹

150. Another component of the early suite of tools facilitating the creation of “full console game[s]” for the iPhone’s hardware components was the Accelerometer-focused API, which enabled “use [of the accelerometer] in [] applications” and would create a “comfortable, smooth way to play [a] game that eve[n] if you’ve never played a video game before, you’ll know exactly what to do when you pick up an iPhone.”²⁶² This hand-in-glove connection between the hardware component sensors and the developer’s game allowed for the physical manipulation of the device in a 3D space to act as a peripheral controller. For example, Sega explained that “the object of *Super Monkey Ball* is to guide AiAi the Monkey through a series of mazes, collecting bananas along the way for extra lives.”²⁶³ To play the game, “[a]ll [a player] has to do to move AiAi [the Monkey] around is tilt the device.”²⁶⁴ Third parties recognized how Apple’s hardware technology and developer tools opened new doors for Sega, *Super Monkey Ball* “[takes] advantage of the iPhone’s accelerometer to

²⁶¹ “Apple WWDC 2010,” *YouTube*, December 31, 2011, at 24:14, <https://www.youtube.com/watch?v=ldFx1ftxs0A>; “Breaking Benjamin, Weezer and more added to Guitar Hero iPhone store,” G. McElroy, July 23, 2010, *engadget.com*, <https://www.engadget.com/2010-07-23-breaking-benjamin-weezer-and-more-added-to-guitar-hero-iphone-s.html>.

²⁶² APL-APPSTORE_00000055-87 at ‘64, ‘73-‘74.

²⁶³ APL-APPSTORE_00000055-87 at ‘73; “Super Monkey Ball goes live on iPhone App Store,” *PocketGamer.com*, <https://www.pocketgamer.com/articles/007630/super-monkey-ball-goes-live-on-iphone-app-store/>; “2008 03 06 Apple March 6 Event, iPhone Software Roadmap,” *YouTube*, November 4, 2016, at 1:00:55, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

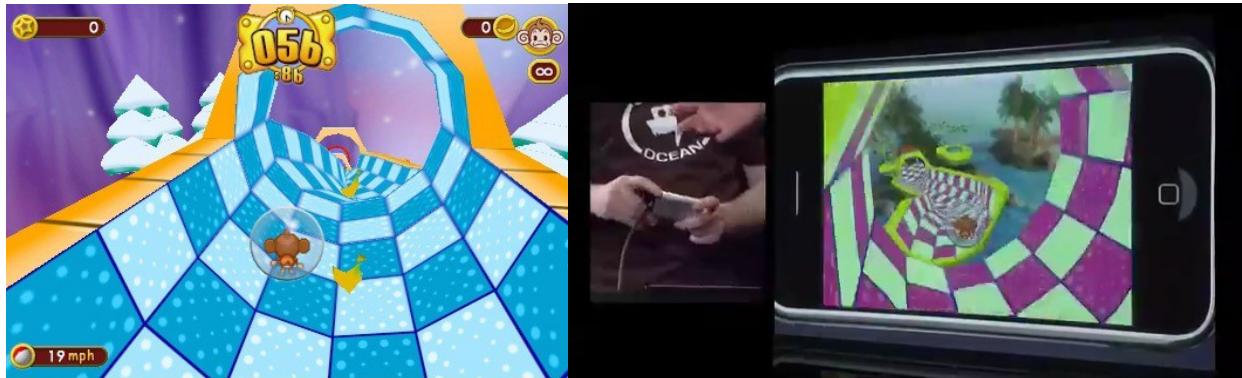
²⁶⁴ APL-APPSTORE_00000055-APL-87 at ‘73.

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control the action.”²⁶⁵ According to Sega, “[t]his feels like it’s always the way *Super Monkey Ball* was meant to be played.”²⁶⁶

Figure 13: *Super Monkey Ball* App – 2008²⁶⁷



151. Apple’s ongoing innovation in tools using 3D environment movement data is reflected in the capabilities of the CoreMotion framework, introduced in iOS 4.0, which is used to process accelerometer, gyroscope, pedometer, magnetometer, barometer and environment-related events.²⁶⁸ “CoreMotion fuses data from the built-in hardware to let you determine precisely how [an] iOS device is oriented and moving in 3D space [The] device motion [can be used] to create an amazingly immersive experience for games, augmented reality, and much more.”²⁶⁹ The “CoreMotion framework provides an iOS app with highly accurate information regarding the

²⁶⁵ “AIM highlights iPhone demo apps,” *MacWorld*, <https://www.macworld.com/article/1132401/aim.html>.

²⁶⁶ APL-APPSTORE_0000055-87 at ‘74; “2008 03 06 Apple March 6 Event, iPhone Software Roadmap,” *YouTube*, November 4, 2016, at 1:01:35, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

²⁶⁷ “Super Monkey Ball goes live on iPhone App Store,” *PocketGamer.com*, <https://www.pocketgamer.com/articles/007630/super-monkey-ball-goes-live-on-iphone-app-store/>; “2008 03 06 Apple March 6 Event, iPhone Software Roadmap,” *YouTube*, November 4, 2016, at 1:01:06, <https://www.youtube.com/watch?v=e6TJ2uwjhVY>.

²⁶⁸ “Core Motion,” *Apple*, <https://developer.apple.com/documentation/coremotion>.

²⁶⁹ “What’s New in Core Motion,” *Apple*, <https://developer.apple.com/videos/play/wwdc2011/423/>; “Understanding Core Motion,” *Apple*, <https://developer.apple.com/videos/play/wwdc2012/524/>; Andy Pham, “Session 524 – Understanding Core Motion,” https://download.developer.apple.com/wwdc_2012/wwdc_2012_session_pdfs/44020_session_524__understanding_coremotion.pdf; “Sensing Device Motion in iOS 4,” *ASCIIfwwdc*, <https://asciifwwdc.com/2010/sessions/423>; “Core Motion,” *Apple*, <https://developer.apple.com/documentation/coremotion>.

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motion and positioning attributes of a device. App developers can easily leverage this technology to create a unique, interactive experience.”²⁷⁰ CoreMotion can be used to address acceleration ambiguity in game apps as well as in health and fitness apps.²⁷¹ It “provides 3D attitude tracking while the [iOS] device is undergoing free-space motion. And it does this by fusing together all of the sensors to relay the advantages of each, while minimizing the disadvantages. And as a developer, what this really means it is enables [the developer] to focus on how [the developer] want[s] to use the motion data rather than the mechanics of trying to get the best from the sensors.”²⁷² Apple has four U.S. patents referring to CoreMotion and one additional U.S. patent application.²⁷³

152. Apple’s ongoing innovation in tools is also demonstrated by its graphics technology. When Apple first offered its 2008 SDK, OpenGL, a framework for real-time 3D graphics, was part of the SDK.²⁷⁴

OpenGL was originally designed [in the 1990s] and its core reflects the origins of hardware accelerated 3D graphics. So updates with new versions and extensions have really served us well by exposing new GPU features and performance techniques. However, there are still some fundamental design choices that no longer apply to current hardware. The OpenGL pipeline was originally an entirely fixed function and although today OpenGL supports a programmable pipeline it doesn’t neatly match that of modern GPUs. Also, asynchronous processing is not a core feature of the API, there are a number of features which allude to the fact that the GPU works in parallel with your app but much of this is implicit.²⁷⁵

153. Apple innovated its enhanced Metal framework because “a new application interface for the GPU was necessary.”²⁷⁶ Metal, introduced with iOS 8, directly communicates with the graphics processors (“GPU”) to render advanced 3D graphics and perform data-parallel computations.²⁷⁷

²⁷⁰ “Motion Events Part 2: Core Motion,” *TechRepublic*, <https://www.techrepublic.com/blog/software-engineer/motion-events-part-2-core-motion/>.

²⁷¹ “Creating Immersive Apps with Core Motion,” *Apple*, <https://developer.apple.com/videos/play/wwdc2017/704/>.

²⁷² “Creating Immersive Apps with Core Motion,” *Apple*, <https://developer.apple.com/videos/play/wwdc2017/704/>.

²⁷³ Schedule 3.3.

²⁷⁴ APL-APPSTORE_00000055-87 at ‘63; “Metal for OpenGL Developers,” *Apple*, <https://developer.apple.com/videos/play/wwdc2018/604/>.

²⁷⁵ “Metal for OpenGL Developers,” *Apple*, <https://developer.apple.com/videos/play/wwdc2018/604/>.

²⁷⁶ “Metal for OpenGL Developers,” *Apple*, <https://developer.apple.com/videos/play/wwdc2018/604/>.

²⁷⁷ “Metal,” *Apple*, <https://developer.apple.com/metal/>; “Metal,” *Apple*, <https://developer.apple.com/documentation/metal>.

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Metal enables the “perform[ance] [of] the most expensive operations less often,” through more efficient rendering of objects, a clear model for multithreaded execution, direct calls to the GPU driver with less processing by the driver, and no need “to perform any expensive internal logging operations to prevent [] objects from getting into some invalid state.”²⁷⁸ Apple has protected Metal with eleven U.S. patents and an additional four U.S. patent applications,²⁷⁹ as well as copyrights²⁸⁰ and registered trademarks on Metal® and Metal Logo™.²⁸¹ Metal technology has both been used and promoted by developers with graphics-intensive applications. For example:

- At Apple Worldwide Developers Conference (“WWDC”) 2014, Tim Sweeney, explained how the technology provided a major development for games: “There are thousands of objects being rendered here in a scene that we couldn’t have dreamed building prior to Metal delivering a ten-fold increase in rendering efficiency. To have this level of graphics capability available on iPhone and iPad now is a stunning breakthrough.”²⁸² At WWDC 2015, Billy Bramer, Fortnite’s then-lead gameplay programmer, took the stage and confirmed that it developed its *Fortnite* game using Metal, explaining that Metal “revolutionized graphics on iOS,” and “enable[d] developers like [Epic] to create richer 3D worlds.”²⁸³ During WWDC 2018, Epic gave a presentation regarding Metal using *Fortnite* on iOS.²⁸⁴
- Stephan Sherman, Co-founder & Chief Creative Officer of developer Super Evil Megacorp, creator of the *Vain Glory* multiplayer online battle arena game discussed his company’s use of Metal to enable the creation of rich, multiplayer gaming experiences on the iPhone that were previously the domain of consoles and PCs:

²⁷⁸ “Metal for OpenGL Developers,” *Apple*, <https://developer.apple.com/videos/play/wwdc2018/604/>.

²⁷⁹ Schedule 3.3.

²⁸⁰ “Metal Sample Code,” *Apple*, <https://developer.apple.com/metal/sample-code/>; for example, download from “Performing Calculations on a GPU,” *Apple*, https://developer.apple.com/documentation/metal/basic_tasks_and_concepts/performing_calculations_on_a_gpu?preferredLanguage=occ; “Metal Developer Tools for Windows Version 1.2 (for use with Xcode 12.2),” *Apple*, https://download.developer.apple.com/Developer_Tools/Metal_Developer_Tools_for_Windows_1.2/Metal_Developer_Tools_for_Windows_1.2.pdf.

²⁸¹ Schedule 2.1.

²⁸² WWDC14 iOS 8 Metal Demo by EPIC Games, June 3, 2014, at 2:19, <https://www.youtube.com/watch?v=NRoGwuSDh3E>.

²⁸³ “Apple WWDC 2015,” *YouTube*, June 15, 2015, at 18:35, 19:57, https://www.youtube.com/watch?v=_p8AsQhaVKI.

²⁸⁴ “Metal for Game Developers,” *Apple*, at 41:30, <https://developer.apple.com/videos/play/wwdc2018/607/>.

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Multiplayer battle arena gaming is the most popular game genre in the world ... *Vain Glory* brings this world-class competitive gaming to iOS We fused our Evil Game Engine with Metal and absolutely love the results on the new iPhone 6. A world of 1.3 million polygons running at 60 frames per second, new environment effects like dust particles and butterflies, new lighting effects like these crystals casting blue light, and more than one hundred fully animated characters all interacting at once ... We founded Super Evil Megacorp to bring the hardcore gaming experiences of PCs and consoles to the mobile generation. This is why we are so thrilled about the performance now possible on the iPhone 6 and Metal.²⁸⁵

- Jeff Boudier of *Replay* explains how the video editing app's advanced features, including real time, desktop-class graphics rendering, are enabled by Metal:

Replay runs computer vision algorithms to find the best accent color for each video then desaturates the rest and with Metal this code runs 20x faster than using the CPU ... See how the light interacts with the text? I can even set the lighting color while my movie is playing, this effect is called volumetric lighting and *Replay* renders it in real time on the iPad, this is truly desktop class performance. We believe video creation should be easy and instant, with this new iPad and Metal, our vision becomes reality.²⁸⁶

154. The team behind the *Primer: AR Home Design* application, which uses augmented reality technology to allow users to visualize interior design changes in real time, has described the benefits of the ARKit framework:

“ARKit anchors our entire app experience... What I love about this SDK is that Apple took the stuff that was incredibly intricate and complex and would've been really hard for us to build and they made it really accessible, abstracting it in ways where we could just be creative

²⁸⁵ Apple Special Event, September 9, 2014, at 20:10, <https://podcasts.apple.com/us/podcast/apple-special-event-september-2014/id275834665?i=1000430692664>.

²⁸⁶ Apple Special Event, October 16, 2014, at 55:22, <https://podcasts.apple.com/us/podcast/apple-special-event-october-2014/id275834665?i=1000430692671>.

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on top of it. Within three or four months of development time we had a great prototype we could take to brands, and give them these superpowers they didn't know they had before.”²⁸⁷

“[O]ur app and our business would not exist without it. We don’t just use ARKit...ARKit is the entire app.”²⁸⁸

155. Another recent example of Apple’s integrated innovation is shown in its contributions to the development of artificial intelligence (“AI”) and machine learning (“ML”) technology. One example is Apple’s CoreML API. The CoreML API enables developers to run real-time analysis and models on data from the iPhone hardware (e.g., camera).²⁸⁹ At Apple’s September 2018 Special Event, Apple featured Nex Team’s *HomeCourt* app to show “an entirely new use case for the iPhone camera using CoreML.”²⁹⁰ *HomeCourt* uses CoreML to track basketball shots by simply pointing an iPhone at a court. Without any sensors on the basketball court, ball, or player, *HomeCourt* will measure a player’s release time and angle of a shot, how fast the player is moving before shooting, and the player’s vertical leap.²⁹¹ *HomeCourt* also took advantage of the new, significantly faster A12 bionic chip in the latest iPhone models, XS, XS Max, and XR, to offer “real-time AI-powered analysis” for the first time.²⁹²

²⁸⁷ “Meeting pandemic challenges, Apple developers grow total billings and sales in the App Store ecosystem by 24 percent to \$643 billion in 2020,” Apple, June 2, 2021, <https://nr.apple.com/dm4i1C5q9c>.

²⁸⁸ “A Global Perspective on the Apple App Store Ecosystem,” Analysis Group, June 2021, p. 17.

²⁸⁹ “September Event 2018 – Apple,” September 13, 2018, *YouTube*, 59:28, <https://www.youtube.com/watch?v=wFTmQ27S7OQ>.

²⁹⁰ “September Event 2018 – Apple,” September 13, 2018, *YouTube*, 59:28, <https://www.youtube.com/watch?v=wFTmQ27S7OQ>; “Meet the developer: Philip Lam,” *Apple*, <https://developer.apple.com/news/?id=wk9cj822>; “HomeCourt: Basketball Training,” *Apple*, <https://apps.apple.com/us/app/homecourt-basketball-training/id1258520424#?platform=iphone>.

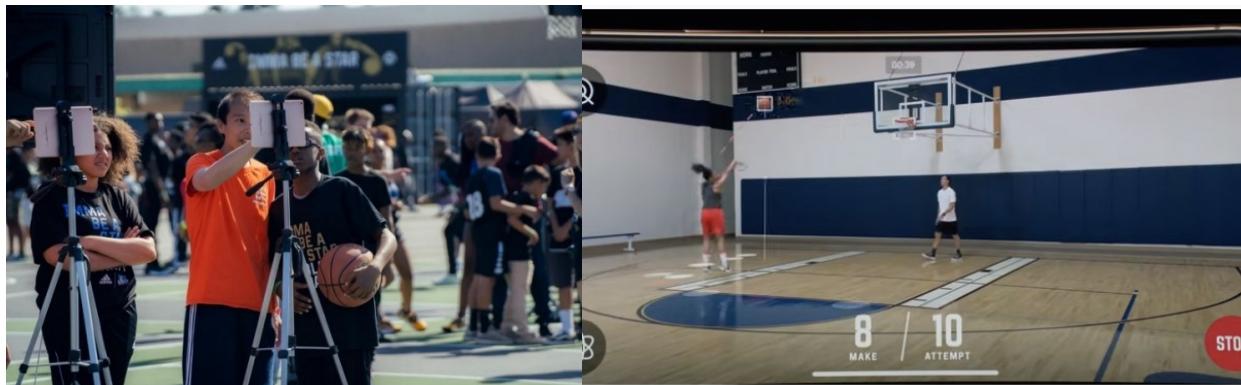
²⁹¹ “September Event 2018 – Apple,” September 13, 2018, *YouTube*, at 59:54, <https://www.youtube.com/watch?v=wFTmQ27S7OQ>; “Meet the developer: Philip Lam,” *Apple*, <https://developer.apple.com/news/?id=wk9cj822>; “HomeCourt: Basketball Training,” *Apple*, <https://apps.apple.com/us/app/homecourt-basketball-training/id1258520424#?platform=iphone>.

²⁹² “September Event 2018 – Apple,” September 13, 2018, *YouTube*, at 1:00:50, <https://www.youtube.com/watch?v=wFTmQ27S7OQ>; “Meet the developer: Philip Lam,” *Apple*, <https://developer.apple.com/news/?id=wk9cj822>; “HomeCourt: Basketball Training,” *Apple*, <https://apps.apple.com/us/app/homecourt-basketball-training/id1258520424#?platform=iphone>.

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Figure 14: *HomeCourt* Requires iPhone Hardware, Software, and APIs – 2018²⁹³



8.4.2. Analysis of Specific App Store Relevant IP

156. I have conducted an illustrative analysis of specific Apple IP relevant to the App Store and related developer tools and services. Specifically, I have identified examples of U.S. patents protecting Apple technology based on a non-exhaustive search for Apple's patents, which due to judgment relating to categorization may be over- or under-inclusive and may count certain patents in multiple categories.²⁹⁴ I have conducted similar searches for registered copyrights and trademarks.

157. Apple holds U.S. patents covering various aspects of the App Store and the tools provided to and used by app developers. I have organized my patent analysis in the following categories: Commonly Used APIs, Privacy/Security, Monetization Options, Graphics/Multimedia, Games, AR/Machine Learning, Sensor Interaction, Interaction with Drive, Connectivity, Health and Fitness, Interaction with Home, Interaction with Other Devices, and Interaction with Web and Maps. In all the categories combined, I identified a total of 42 specific developer technologies for which I pulled the associated granted U.S. patent and U.S. patent application counts.²⁹⁵ Across these example

²⁹³ “September Event 2018 – Apple,” September 13, 2018, *YouTube*, at 1:01:18, <https://www.youtube.com/watch?v=wFTmQ27S7OQ>; “Meet the developer: Philip Lam,” *Apple*, <https://developer.apple.com/news/?id=wk9cj822>; “HomeCourt: Basketball Training,” *Apple*, <https://apps.apple.com/us/app/homecourt-basketball-training/id1258520424#?platform=iphone>.

²⁹⁴ These searches included the search term in the title, abstract, body or claims of the patents.

²⁹⁵ Schedule 3.3.

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developer technologies, I've identified a total of 1,184 active U.S. patents and patent applications owned by Apple.

158. My process for conducting the patent analysis consisted of the following steps. The first step was an identification of search terms that represented technologies Apple offers to developers, organized by the categories listed above. Next, I tested the results of each individual search term through an initial review of select grants and applications. Based on the results, I determined if limitations to the search terms were required to further refine the results to ensure relevance to the App Store.²⁹⁶ If limitations were required, I tested the results of each search term with limitations through manual review of a selection of grants and applications. Lastly, I conducted a combined search with all terms and limitations and manually removed grants and applications that I found not to be relevant. A process diagram indicating the flow of my overall patent analysis methodology is displayed in Schedule 3.4.

159. A few notable examples of Apple developer technologies with associated patent counts are summarized below. The full list of developer technologies, their definitions, and patent counts for each technology can be found in Appendix C. In summary, Apple holds U.S. patents covering various aspects of the App Store and the tools provided to and used by app developers, such as:

- 165 U.S. patents and an additional 91 U.S. patent applications referring to the App Store
- 356 U.S. patents and an additional 193 U.S. patent applications referring to Security
- 31 U.S. patents and an additional 15 U.S. patent applications referring to Xcode
- 47 U.S. patents and an additional 37 U.S. patent applications referring to Authentication
- 22 U.S. patents and an additional 6 U.S. patent applications referring to UIKit
- 22 U.S. patents and an additional 23 U.S. patent applications referring to Apple Pay

²⁹⁶ Within Innography, a combination of search syntax and Booleans were used to filter down the broad results of certain keywords. Certain search terms were excluded from the search function and/or results because they were too broad or did not result in relevant patents.

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160. Apple's patents complement its protection of its various software, tools and other technology through copyrights and trademarks. Apple uses copyright to protect, for example:²⁹⁷

- Documentation and source code;
- iOS content
- APIs;
- beta iOS releases;
- SDKs;
- Other work such as instructional materials, multimedia content, articles teaching about various software tools; and
- Features such as articles describing how to debug a widget, create app clip codes, or create a custom keyboard, as well as any sample source code that is provided to app developers.²⁹⁸

161. When providing sample source code, Apple includes a license that reiterates its copyright protection of such code and associated documentation and requires that the copyright notice be included in all copies or substantial portions of that code and documentation.²⁹⁹ Apple has registered in the U.S. over 5,000 copyrights, including 232 copyrights using the term iOS, 212 of which contain iOS in the title.³⁰⁰

162. Apple obtains trademarks, service marks, trade names and trade dress as protection of its rights in these valuable assets. A non-exhaustive list of Apple's trademarks can be found on its website, including terms relating to the App Store and software tools used by app developers:³⁰¹

- App Store®

²⁹⁷ "Apple Website Terms of Use," Apple, <https://www.apple.com/legal/internet-services/terms/site.html>; "Software License Agreements," Apple, <https://www.apple.com/legal/sla/>.

²⁹⁸ "Apple Developer Documentation," Apple, <https://developer.apple.com/documentation/>.

²⁹⁹ "Sample Code," Apple, <https://developer.apple.com/wwdc20/sample-code/>; for example, download from "Adopting Menus and UIActions in your User Interface," Apple, https://developer.apple.com/documentation/uikit/menus_and_shortcuts/adopting_menus_and_uiactions_in_your_user_interface.

³⁰⁰ Schedule 2.0.

³⁰¹ "Apple Trademark List," Apple, <https://www.apple.com/legal/intellectual-property/trademark/appletmlist.html>.

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- CloudKit®
- Core ML®
- iAd®
- Metal®
- Metal Logo™
- Multi-Touch™
- Quartz®
- Safari®
- Swift®
- Swift Logo®
- SwiftUI™
- There's an app for that®

163. Apple's trademark IP assets have significant value. For example, Apple has invested in, advertised, marketed, and promoted the APP STORE mark. According to Apple's Complaint alleging trademark infringement against Amazon.com for the company's promotion of an "Appstore Developer Portal" and "Appstore Developer Program," by 2011, Apple had spent "millions of dollars on print, television, and internet advertising ... and obtained registrations of the APP STORE mark covering more than fifty foreign jurisdictions, including the European Union, Japan, and China."³⁰² According to Apple:

From Apple's launch of the APP STORE service in 2008, Apple has prominently featured the APP STORE mark in print advertising in the United States, California, and elsewhere. The mark has been featured in such print advertising sponsored both by Apple as well as AT&T (which offers wireless connectivity for certain Apple mobile devices). These ads have appeared in such magazines and newspapers as Fortune, The New Yorker, The Economist, Newsweek, Time, The New York Times, the Washington Post, as well as numerous other regional and local newspapers. As part of its marketing for the APP STORE service, Apple has implemented a unique television advertising campaign Not surprisingly given the

³⁰² Complaint, *Apple Inc. v. Amazon.com, Inc.*, Case No. 4:11-cv-01327-PJH, March 18, 2011, ¶¶14, 25.

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success of Apple's APP STORE service, the service and Apple's APP STORE mark have been the subject of an overwhelming amount of high-profile positive unsolicited media coverage in the United States and California. These articles recognize the APP STORE mark as referring exclusively to Apple's service.³⁰³

164. Apple has invested in trademark protection of its advertising of the App Store. In 2009, Apple filed for a trademark on the phrase "There's an app for that," used by Apple in TV ads to highlight its App Store and the numerous apps it offers.³⁰⁴ This phrase was described by *Wired* as "so catchy that it's endlessly parroted by the media."³⁰⁵ According to CNN at the time: "The slogan has been used by Apple to hammer home what the company feels is a major advantage[] over its smart-phone rivals. The Apple App Store has more than 250,000 apps for the iPhone, iPad and iPod – more than any competitor."³⁰⁶ Due in part to Apple's extensive branding efforts, iOS consumers equate the App Store (and associated trademarks) with the privacy and security themes at the core of Apple's corporate identity. Specifically, Apple "deliver[s] a brand promise of – of privacy and security and safety."³⁰⁷ iOS developers benefit significantly from the association between the App Store and security/safety, as consumers inherently trust the safety and privacy of the applications distributed via the App Store. Apple CEO Tim Cook testified, "the developer depends on the store being a safe and trusted place where customers want to come and feel good about transacting."³⁰⁸ Further, he explained that the App Store application review process enables users to "be assured that it's safe and trusted."³⁰⁹

165. I have not conducted an analysis of Apple's trade secrets, as trade secrets in general retain their value by being inaccessible and unknown to competitors, as well as the general public.

³⁰³ Complaint, *Apple Inc. v. Amazon.com, Inc.*, Case No. 4:11-cv-01327-PJH, March 18, 2011, ¶18.

³⁰⁴ "Apple Registers Trademark for 'There's an App for That,'" *Wired*, October 11, 2010, <https://www.wired.com/2010/10/app-for-that/>.

³⁰⁵ "Apple Registers Trademark for 'There's an App for That,'" *Wired*, October 11, 2010, <https://www.wired.com/2010/10/app-for-that/>.

³⁰⁶ "Apple Trademarks 'There's an app for that,'" CNN, October 12, 2010, <http://www.cnn.com/2010/TECH/mobile/10/12/app.for.that/index.html>.

³⁰⁷ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,852:18-19.

³⁰⁸ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,885:9-11.

³⁰⁹ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,994:6-10.

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8.5. Apple IP Usage Differs Among Proposed Developer Class Members

166. The proposed developer class members implement, rely upon, and benefit from varied combinations of a wide range of Apple intellectual property. For example, graphics-intensive game developers (e.g., Epic Games) use specific frameworks suitable for their needs, such as the Metal graphics framework.³¹⁰ Meanwhile, developers of video streaming apps may use frameworks like FairPlay Streaming, HTTP Live Streaming, and AVKit instead. Developers of simpler text-based apps (e.g., notepads or dictionaries), on the other hand, may not need gaming and streaming frameworks and instead rely on a more basic subset of the proprietary development tools that Apple provides under the Developer Program. In developing and supporting 1.8 million iOS apps,³¹¹ thousands of active iOS developers implement innumerable combinations of the proprietary Apple frameworks, tools, APIs, and technologies provided under the Developer Program (see Section 7.4 for details of the program).

167. The App Store application categories offer one possible structure through which developers' IP usage can be viewed.³¹² Given the use case-specific nature of the many of the thousands of APIs provided under the Developer Program, by definition, developers in the twenty-seven application categories are using different subsets of Apple's developer tools. For instance, there are APIs specifically tailored to video content, audio content, game development, health tracking, transacting, data transfer, physical sensors, authentication, advertising, and internet of things, to name a few.³¹³ Developers working within each of the 27 applications categories integrate unique combinations of these tools to build the particular functionality appropriate for an application.

168. To further understand IP usage among developers, I've analyzed Apple's patent portfolio to understand the variety of Apple IP practiced by individual developers. Building from my patent analysis described in Section 8.4.2, I have conducted an exemplary patent analysis on a subset of the aforementioned application categories, and, in particular, the Games, Entertainment, and Music categories, which transaction data produced by Apple identifies as producing [REDACTED] of Apple's App Store revenue in FY2020 (Games [REDACTED], Entertainment [REDACTED], and Music [REDACTED]).³¹⁴ As

³¹⁰ "Metal for Game Developers," *Apple*, at 41:30, <https://developer.apple.com/videos/play/wwdc2018/607/>.

³¹¹ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,853:5.

³¹² Schedule 3.0 lays out the full list of App Store categories and definitions, ranging from books, weather, and finance to games, entertainment, and medical.

³¹³ "Technologies," *Apple*, <https://developer.apple.com/documentation/technologies>.

³¹⁴ Expert Report of Lorin Hitt, August 10, 2021, ¶50.

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described below, I have analyzed subsets of Apple's patent portfolio relevant to each of these three application categories.

169. Based on a combination of public Developer Program documentation, public presentations, USPTO data, and documents produced in this case, I have tallied IP counts in the table below. This table shows examples of proprietary Apple technology relevant to each of the top three grossing application categories, as well as the identified patent counts directly associated with each.

Figure 15: Exemplary Application Category IP Comparison³¹⁵

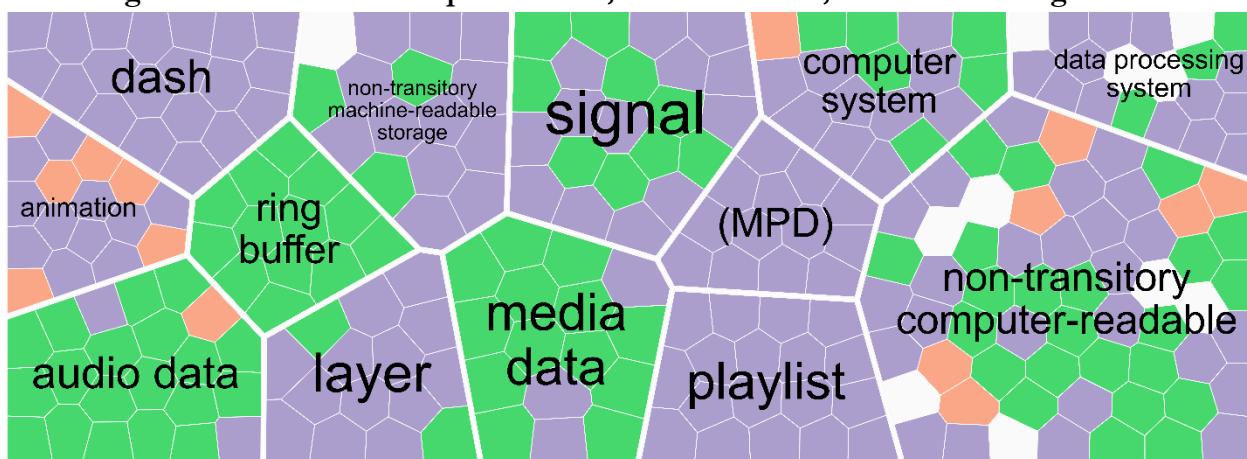
Category	Top Grossing Applications in Category ³¹⁶	Illustrative Category Technology	Patent Count
Games	Roblox, Candy Crush Saga, Pokemon Go	Metal, GameKit, ReplayKit	19
Entertainment	HBO Max, Disney+, Hulu	CoreVideo, HTTP Live Streaming	83
Music	Pandora, YouTube Music, Amazon Music	CoreAudio, AudioToolBox	44

170. This patent data is presented visually below, where the patents associated with the identified frameworks (Metal, CoreAudio, etc.) in each of the three categories (Games, Entertainment, and Music) are represented by a color. The landscape map shows the concentration of these patents across a range of relevant technical concepts.

³¹⁵ Schedule 3.3; Innography Patent Database, accessed July 2021.

³¹⁶ "Top Charts: iPhone – US," SensorTower, <https://sensortower.com/ios/rankings/top/iphone/us/all-categories?date=2021-07-08>.

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Figure 16: Patent Landscape – Games, Entertainment, and Music Categories³¹⁷

Orange: Games (Metal, GameKit, ReplayKit) | Purple: Entertainment (CoreVideo, HTTP Live Streaming) | Green: Music (CoreAudio, AudioToolBox) | White: In Multiple Subsets

171. This patent landscape is a visual representation of select relevant technical concepts addressed by the patents identified for each of the three application categories. As shown in the figure, the patents associated with each application category represent distinct combinations of such concepts. For instance, unsurprisingly, the music-related patents are highly concentrated in “audio data,” while entertainment-related patents permeate the “playlist” and “layer” concepts. Other technical concepts, like “animation” or “non-transitory computer-readable,” are relevant to two or all three of the exemplary application categories. The white colored cells in the graphic represent patent filings that overlap among multiple groups, the sparse presence of which demonstrates the predominately unique nature of the patents relevant to each application category.

172. Not only do developers’ use of Apple IP vary greatly among application categories, as illustrated above, but it is disparate within each category as well. For instance, there is a broad spectrum of application design complexity just within just the Games category. Epic focused on the significance of the Metal graphics framework in developing the “rich[] 3D world[]” of *Fortnite*.³¹⁸ During WWDC 2018, Epic gave a presentation regarding Metal using *Fortnite* on iOS.³¹⁹ Sega’s

³¹⁷ Innography Patent Database, accessed August 2021.

³¹⁸ “Apple WWDC 2015,” YouTube, June 15, 2015, at 18:35, 19:57, https://www.youtube.com/watch?v=_p8AsQhaVKI.

³¹⁹ “Metal for Game Developers,” Apple, at 41:30, <https://developer.apple.com/videos/play/wwdc2018/607/>.

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Monkey Ball game and Tapulous's "Riddim Ribbon" app game, for example, highlighted the use of motion APIs to rely upon outputs from the iPhone's accelerometer as a core aspect of gameplay interaction.³²⁰ *Minecraft* developer Mojang focused on the role of ARKit in enabling unique gameplay features in its *Minecraft* app, such as permitting players to insert themselves into a game.³²¹

173. Ultimately, the breadth of implementation of, and reliance on, Apple intellectual property and proprietary developer support resources is unique on a developer-by-developer (and even application-by-application) basis. Therefore, from an Apple intellectual property rights usage perspective, the proposed developer class members are disparate.

8.6. Apple IP Usage Differs Among Proposed Consumer Class Members

174. Apple IP usage varies widely among iOS users as well, including among both proposed class members and non-members. A user's Apple IP reliance is dependent on the unique preferences and habits of that consumer within the iOS ecosystem, including, but not limited to, the specific device model they use, the hardware features they use, the specific applications they download, the application features they use, and their App Store purchasing habits. Transaction data provided by Apple demonstrates some of the variety of consumption habits among proposed consumer class members. For example, about [REDACTED] of Apple IDs reflected in the data spent no more than \$10 in the App Store from July 10, 2008 through April 25, 2021, a subset of the more than [REDACTED] that spent no more than \$150 over the same period. This is in contrast to more than [REDACTED] of accounts that spent over \$1,500 during the period.³²² As for genres, over [REDACTED] of users have downloaded at least one game, and over [REDACTED] have spent money in the gaming category.³²³ By contrast, the entertainment category has also been downloaded by over [REDACTED] of users, yet less than [REDACTED] have spent money in that category.³²⁴ Consumers vary widely in the number of downloaded applications as well, with over [REDACTED] downloading fewer than 50 applications over the aforementioned 12+ year timeframe, while more than [REDACTED] of the group downloaded more than 700 applications during that time.³²⁵

³²⁰ Apple Special Event, September 9, 2009, at 39:40, <https://youtu.be/6E-QA1rRhxQ?t=2379>.

³²¹ Apple WWDC, June 2, 2019, at 2:01:56, <https://podcasts.apple.com/us/podcast/apple-wwdc-2019-keynote-address/id275834665?i=1000440615083>.

³²² Expert Report of Lorin Hitt, August 10, 2021, Figure 16 at ¶74.

³²³ Expert Report of Lorin Hitt, August 10, 2021, Figure 17 at ¶76, Figure 18 at ¶77.

³²⁴ Expert Report of Lorin Hitt, August 10, 2021, Figure 17 at ¶76, Figure 18 at ¶77.

³²⁵ Expert Report of Lorin Hitt, August 10, 2021, Figure 14 at ¶72.

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175. Among this transaction data are unique profiles for millions of members of the iOS ecosystem. For instance, one consumer may be a dedicated gamer who spends hundreds of dollars per year across multiple iOS games, while another uses their iPhone primarily for phone calls, text messages, and fitness applications, and a third chiefly uses their iPhone for subscription video streaming services. Each of these three hypothetical consumers, as well as each actual owner of the more than one billion active iPhones worldwide³²⁶, interact with, rely upon, and benefit from a distinct and unique set of Apple intellectual property. Therefore, from an Apple intellectual property rights usage perspective, the proposed consumer class members are disparate.

³²⁶ “Apple sees revenue growth accelerating after setting record for iPhone sales, China strength,” Reuters, January 27, 2021, <https://www.reuters.com/article/us-apple-results/apple-tops-wall-street-expectations-on-record-iphone-revenue-china-sales-surge-idUSKBN29W2TD?ll=0>.

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9. PLAINTIFFS' EXPERTS IGNORE APPLE'S IP AND ITS NECESSARY USE FOR NATIVE IOS APPS

9.1. Plaintiffs' Experts Ignore the Breadth and Importance of Apple's IP Rights

176. The Plaintiffs' experts, Dr. Economides, Mr. Elhauge, Mr. Tregillis, and Dr. McFadden, prepared and relied on analyses and proposals related to Apple's App Store in forming their conclusions. It is my opinion that Plaintiffs' experts' analyses and proposals, and as a result their ultimate conclusions, are flawed because the Plaintiffs' experts did not address or otherwise account for important facts, including:

- Apple protects its IP with patents, copyrights and trademarks, and as trade secrets, including protection of the APIs and SDKs used by the Developer Plaintiffs, as summarized in Section 8;
- The Consumer Plaintiffs benefit from Apple's IP both directly through their use of Apple's hardware and software and indirectly through their use of apps which are created by developers using Apple IP, as summarized in Section 8.4.1; and
- The Named Developer Plaintiffs' testimony that developers use Apple's IP:
 - Richard Czeslawski, one of the Named Developer Plaintiffs, testified at deposition:

Q: Are you generally aware that in order to put your app on the App Store, you have to use Apple's intellectual property in order to accomplish that goal?

Mr. Czeslawski: I'm generally aware of that, yes.

Q: Okay. And you agree that that's an important service that Apple provides, that intellectual property that makes it possible to put your app on the App Store?

Mr. Czeslawski: I would agree that since they created the platform, that they should provide the tools to develop on the platform.³²⁷

³²⁷ Richard Czeslawski, Deposition, June 17, 2021, p. 209:4-16.

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- Donald Cameron, another of the Named Developer Plaintiffs, similarly acknowledges that he received a license to Apple's IP:

Q: Do you understand that as part of signing that developer program license agreement, you acquired a license to use Apple's intellectual property?

Mr. Cameron: Yes, of course.

Q: Okay. And do you agree that Apple's entitled to a return on its investment for its intellectual property?

Mr. Cameron: Yes.

Q: You would agree that Apple doesn't need to provide you access to its intellectual property for free; correct?

Mr. Cameron: Yes.³²⁸

177. Prior to opining that the Plaintiffs' experts' reports do not address the importance of Apple's IP and the role of Apple's IP rights, I searched the reports of Dr. Economides, Mr. Elhauge, Mr. Tregillis, and Dr. McFadden for consideration of Apple's IP. In my searches, I found limited references to Apple's IP and IP rights, described below.

- Dr. Economides' report (excluding his CV and qualifications sections) mentions "copyright" one time when listing the name of the Digital Millennium Copyright Act. Dr. Economides' report never mentions "trademark," "patent," "trade secret," "know-how," "intellectual property," or "IP rights."³²⁹
- Mr. Elhauge's report (excluding his CV and qualifications sections) uses the phrase "intellectual property" twice to describe barriers to entry within the Smartphone and Tablet market, not the App Store or other after-markets. Mr. Elhauge's report mentions "trademark" once when describing "Permitted Entities" within a theoretical Apple Business Manager agreement. Mr. Elhauge's report mentions "patent" once when describing barriers

³²⁸ Donald R. Cameron, Deposition, June 25, 2021, p. 103:1-17.

³²⁹ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶12.

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to entry in the Smartphone and Tablet market. Mr. Elhauge's report never mentions "copyright," "trade secret," "know-how," or "IP rights."³³⁰

- Mr. Tregillis' report (excluding his CV and qualifications sections) contains no mention of "intellectual property," "trademark," "patent," "copyright," "trade secret," "know-how," or "IP rights."³³¹
- Dr. McFadden's report (excluding his CV and qualifications sections) mentions "copyright" one time when listing the name of the Copyright Review Board in a footnote. Dr. McFadden's report never mentions "intellectual property," "trademark," "patent," "trade secret," "know-how," or "IP rights."³³²

178. The six references to intellectual property related terms in the total 427 pages³³³, excluding exhibits, of the Plaintiffs' experts' reports compare to 14 statements about intellectual property terms in just 29 pages of Mr. Schiller's September 15, 2020 declaration submitted in the related Epic matter.³³⁴ Interestingly, the six IP related term mentions in the Plaintiffs' experts reports is in contrast to 51 collective mentions of IP related terms in those experts' CVs and qualifications sections.³³⁵

³³⁰ Expert Report of Professor Einer Elhauge, June 1, 2021, ¶220, 255 footnote 357.

³³¹ Expert Report of Christian Tregillis, June 1, 2021.

³³² Expert Report of Daniel McFadden, June 1, 2021, ¶185 footnote 251.

³³³ Total of 320 pages, excluding exhibits, of the Developer Plaintiffs' experts' reports and 107 pages, excluding exhibits, of the Consumer Plaintiffs' expert's report.

³³⁴ Mr. Schiller mentions the phrase "Intellectual Property" eleven times, the phrase "Copyright" one time, the phrase "Trademark" one time, and the phrase "IP Rights" one time. *See Declaration of Philip W. Schiller In Support of Defendant Apple Inc.'s Opposition to Plaintiff's Motion for a Preliminary Injunction*, September 15, 2020, pp. 4, 6, 11, 12, 15, 16 and 28.

³³⁵ Mr. Tregillis' CV uses the phrase "Intellectual Property" twenty-one times, once in describing his role as a partner in Hemming Morse's Los Angeles office, and twenty times when listing his Publication, Presentation, and Speaking experience. Mr. Tregillis' CV mentions "Trademark" twice when listing his Publication, Presentation, and Speaking experience. Mr. Tregillis' CV mentions "Patent" nine times when listing his Publication, Presentation, and Speaking experience. Mr. Tregillis' CV mentions "Copyright" twice, once when describing select engagement experience, and once when listing his Publication, Presentation, and Speaking experience. Mr. Elhauge's CV and Qualifications mentions "Patent" twelve times, once when describing experience providing expert testimony, twice when describing academic publications, and nine times when listing expert testimony experience. Dr. Economides' CV mentions "Trademark" three times when listing Published and Accepted Papers. Dr. Economides' CV mentions "Patent" two times, once when listing Published and Accepted Papers and once when listing "Work In Progress" Papers. References to Intellectual Property related terms embedded into URLs are excluded.

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179. In fact, Mr. Elhauge testified that “it would not alter any of [his] conclusions one way or the other” even if a company does use or practice Apple’s intellectual property to distribute iOS apps.³³⁶ He did so even though he also testified that he believes Apple can condition the use of its iOS code by a rival iOS app distributor under its intellectual property rights,³³⁷ and that “if a product is protected from copying intellectual property rights, then another company cannot make or distribute that [] product.”³³⁸ When asked if “charging a payment for use of intellectual property [is] exclusionary,” he responded, “[g]enerally, no.”³³⁹ Mr. Elhauge consistently testified that he “think[s] there would be” licenses from Apple of its intellectual property to competing iOS app distributors” in his proposed but-for world—although he did not know “whether they would have to be free or not.”³⁴⁰ The analysis proffered by Mr. Elhauge in his expert report, however, does not consider the terms or role of any such licenses to Apple’s IP.

180. Similarly, Dr. Economides testified that his analysis of a proposed but-for world “do[es] not include any payment whatsoever for the use of Apple’s APIs by any rival App Store,” explaining that “[he] did not set up any additional fees to Apple in the but-for world besides the....commission fee, which [he] calculate[s].”³⁴¹ Although Dr. Economides admits that, for a third party to run a store and sell iOS apps, “there has to be some connection with the Apple operating system.... [o]therwise the stores will not be able to work,” he also discounts any right of Apple to a return on its intellectual property because he does not perceive them as being subject to a “severe imposition.”

So if you want to call this an imposition on....the intellectual property of Apple, you can call it, but in some way, this is kind of normal type of business for interconnecting products. It's not something unique. And it's not something abnormal. So I would say this would be required, but I don't see it as....a severe imposition on the intellectual property of Apple.³⁴²

181. The questions of whether Apple holds exclusive rights over its IP, and whether it is entitled to a return on its IP, are not, however, answered by looking at the degree of severity of the imposition on such rights.

³³⁶ Einer Elhauge, Deposition, July 30, 2021, p. 88:3-19.

³³⁷ Einer Elhauge, Deposition, July 30, 2021, p. 87:11-14.

³³⁸ Einer Elhauge, Deposition, July 30, 2021, p. 85:2-8.

³³⁹ Einer Elhauge, Deposition, July 30, 2021, p. 93:13-16.

³⁴⁰ Einer Elhauge, Deposition, July 30, 2021, p. 94:8-25.

³⁴¹ Nicholas Economides, Deposition, August 4, 2021, p. 111:17-19.

³⁴² Nicholas Economides, Deposition, August 4, 2021, p. 110:16-23.

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182. Dr. McFadden testified that “[his] analysis does not depend on Apple abrogating its property rights”—but he also testified that “the iOS operating system is protected by intellectual property rights....as a general matter [though he] do[esn’t] know specifically what those property rights are.”³⁴³

183. Despite Apple’s right to condition the use of its own IP, and Plaintiffs’ experts’ acknowledgement of the existence of such Apple IP, Plaintiffs’ experts’ analyses and proposals nonetheless assume and rely on broad access to Apple’s IP, such as access to Apple’s IP-protected iPhone features, iOS, APIs, and proprietary tools used for app reviews, potentially including those tools protected as trade secrets or others not shared with third parties—but without accounting for the impact of those IP rights on their analyses and proposals. The Plaintiffs’ experts describe a hypothetical “but-for” world that includes proposed solutions for the alleged flaws in Apple’s current business model. In the but-for world, however, there is no discussion of:

- The Developer Plaintiffs’ and Consumer Plaintiffs’ use of Apple’s IP;
- Differentiated use (e.g., categorical or frequency) of Apple’s wide array of IP among Developer Plaintiffs and Consumer Plaintiffs;
- How Apple’s IP was created;
- How Apple’s IP would continue to be developed and maintained in the but-for world;
- Apple’s rights to enforce its IP and exercise its licensing rights in the but-for world; or
- How Apple would generate a return on its IP investments in the absence of the contested practices.

184. Plaintiffs’ experts’ proposals are flawed because of this assumption of access, without accounting for Apple’s right to set the terms of or otherwise condition such access, including the terms and conditions of any license agreements or the compensation due to Apple for access to its exclusive IP rights.

185. Apple has made substantial investments in innovation related to the iPhone, iOS, APIs, security, and more. Assuming Apple continues its investment and innovation, the Plaintiffs’ experts’

³⁴³ Daniel McFadden, Deposition, August 3, 2021, p. 19:25-20:11.

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assumption of open access to Apple's IP rights could include both current technology and future Apple IP in the APIs and other developer tools made available to and/or used by developers, and even the iOS operating system, which Apple does not license but, as Mr. Elhauge admitted, "is integral to the device itself for the iPhone."³⁴⁴

186. Such assumptions of broad access to Apple's IP ignore the realities of intellectual property development, ownership, and licensing. Limiting an IP owners' rights to be compensated via licensing reduces incentives for innovation and investment. As stated in Section 6.2, "IP incentivizes the creation of new goods and services by conferring exclusive rights to their creators."³⁴⁵

9.2. Plaintiff's Experts Ignore Apple's IP Rights in Their Theoretical Alternatives

187. Plaintiffs' experts' lack of consideration for Apple's IP, technology, and services can be clearly seen in the comparables to the App Store that they put forth in their reports. Dr. Economides, for example, concludes that "in a but-for world in which Apple did not exclude all potential rivals, the history of the iOS app distribution market indicates that from the beginning there were firms that could have entered the market (and even did operate without Apple's acceptance)."³⁴⁶ Further, Dr. Economides argues that "[i]f Apple were to allow alternative app stores on iOS, there are several firms well-positioned to enter the market." He lists Amazon, Samsung, Aptoide, Steam, Epic, Microsoft, and Blizzard/Activision as examples.³⁴⁷ Mr. Elhauge similarly lists Steam, the Epic Games Store, and the Microsoft Store.³⁴⁸ Mr. Tregillis cites eBay, Etsy, Rakuten, MercadoLibre, and Alibaba as examples of marketplaces for purposes of his profitability analysis, although he expressly disclaimed any opinion on comparability when deposed.³⁴⁹

188. As reflected by their selection of supposed comparables, the Plaintiffs' experts incorrectly view the App Store as a simple storefront isolated from a larger ecosystem. In doing so, they ignore

³⁴⁴ Einer Elhauge, Deposition, July 30, 2021, p. 58:18-22.

³⁴⁵ "Intellectual Property and the U.S. Economy: 2016 Update," *Economics & Statistics Administration and the U.S. Patent and Trademark Office*, September 2016, <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>, p. 1.

³⁴⁶ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶11.

³⁴⁷ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶14.

³⁴⁸ Expert Report of Professor Einer Elhauge, June 1, 2021, ¶84.

³⁴⁹ Expert Report of Mr. Christian Tregillis, June 1, 2021, ¶79; Christian Tregillis, Deposition, August 2, 2021, p. 142:18-21.

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all of the IP across the iOS ecosystem that developers and consumers use and enjoy. None of the examples listed by the Plaintiffs' experts purport to provide the same level of IP and services that Apple does to developers and users. The following are examples of the scope of IP and services that Apple provides above and beyond what is provided by the examples put forth by the Plaintiffs' experts:

- Apple has designed and developed the App Store as “more than just a storefront – it’s an innovative destination focused on bringing you amazing experiences...[ensuring] the highest standards for privacy, security, and content.”³⁵⁰ There has been tremendous growth in the use of the App Store since 2008, with cumulative downloads from the App Store now exceeding 180 billion and the number of available apps growing from approximately 500 to 1.8 million, reflecting the support of Apple's innovation to the App Store, the licensed use of developer tools provided by Apple, and the safe and trustworthy environment created by Apple.³⁵¹ With regard to the licensed use of developer tools, the Apple Developer Program License Agreement specifically states that, “Apple is willing to grant [the developer] a limited license to use the Apple Software and Services provided to [the developer] under this Program to develop and test [the developer’s] Applications on the terms and conditions set forth in this Agreement.”³⁵² A license to tools and software to develop and test applications is indicative of more than of a mere storefront such as the examples put forth by the Plaintiffs' experts.
- Since the beginning of the App Store, Apple has taken a “a multilayered approach to try to keep the iPhone reliable and secure for [Apple’s] customers.”³⁵³ The App Store, which comprises 175 storefronts in over 40 languages, has “100% of apps ... automatically screened for known malware.”³⁵⁴ “Over 16K apps use Apple health technologies like HealthKit, CareKit, and ResearchKit designed to protect patient privacy.”³⁵⁵ Apple reports

³⁵⁰ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

³⁵¹ Schedule 5.0; “App Store,” *Apple*, <https://www.apple.com/app-store/>, accessed August 5, 2021; Trial Transcript, Testimony of Philip Schiller, May 17, 2021, Trial at 2,753:24-25, 2,760:1-21, 2,780:12-17, 2,784:10-2,787:4; APL-APPSTORE_10137258-263; APL-APPSTORE_10334884-960.

³⁵² APL-APPSTORE_10334884-960 at ‘884.

³⁵³ “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industry-s-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>.

³⁵⁴ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

³⁵⁵ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

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that it rejected over 215,000 submissions the prior year for violating privacy guidelines.³⁵⁶ As an additional layer of consumer protection, apps on the iPhone are not permitted to pull user data from other apps.³⁵⁷ To ensure compliance with Apple's guidelines, “[e]very week over 500 dedicated experts around the world review over 100K apps.”³⁵⁸ Apple also works to enforce intellectual property rights by taking down apps that do not have rights to any included copyrighted materials.³⁵⁹

- Beyond the IP and services related to the App Store itself, Apple CEO Tim Cook acknowledged in his deposition that the integration of hardware, software and services was one of the distinguishing features of the iPhone when it was launched and that the “integration of hardware and software and the services element are key to having the customer experience [be] this sort of delightful experience.”³⁶⁰ As outlined in Section 8.1, beyond the IP specific to iOS software, Apple has 24,096 issued U.S. utility patents, 3,157 issued design patents, and 3,754 filed U.S. applications. A significant portion of this portfolio covers hardware and other elements of the integrated ecosystem that Mr. Cook references.
- “Apple designs security into the core of its platforms Every Apple device combines hardware, software, and services designed to work together for maximum security and a transparent user experience in service of the ultimate goal of keeping personal information safe. For example, Apple-designed silicon and security hardware powers critical security features. And software protections work to keep the operating system and third-party apps protected. Finally, services provide a mechanism for secure and timely software updates, power a protected app ecosystem, and facilitate secure communications and payments. As a result, Apple devices protect not only the device and its data but the entire ecosystem, including everything users do locally, on networks, and with key internet services.”³⁶¹

³⁵⁶ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

³⁵⁷ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

³⁵⁸ “App Store,” *Apple*, <https://www.apple.com/app-store/>.

³⁵⁹ “The Mobile Industry’s Never Seen Anything Like This: An Interview with Steve Jobs at the App Store’s Launch,” *Wall Street Journal*, July 25, 2018, <https://www.wsj.com/articles/the-mobile-industrys-never-seen-anything-like-this-an-interview-with-steve-jobs-at-the-app-stores-launch-1532527201>; “App Store Review Guidelines,” *Apple*, <https://developer.apple.com/app-store/review/guidelines/>.

³⁶⁰ Timothy Cook, Deposition, February 12, 2021, pp. 138:19-139:17.

³⁶¹ “Introduction to Apple platform security,” *Apple*, <https://support.apple.com/guide/security/intro-to-apple-platform-security-secccd5016d31/web>.

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- Apple's innovations in support of app developers reflect and build on previous improvements to hardware, the operating system, and tools and services for app developers. Mr. Schiller testified that: "from my perspective, [the] majority of engineering Apple does is to support and benefit app developers, whether it is new hardware features that developers will take advantage of, new software features in the operating systems and in the APIs we developed, and the capabilities of the [App Store] to distribute [and] support their apps."³⁶² In fact, hardware and software teams work together at Apple, consistent with the Company's goal to "make a product as a complete experience of the hardware and software working together to create a unique offering."³⁶³ To this point, Apple has at least 356 U.S. patent grants and 193 U.S. applications covering foundational security APIs.³⁶⁴

189. Plaintiffs' experts' but-for world proposals do not address how Apple would be compensated for the extensive IP assets and services it provides, which it has invested over \$100 billion in R&D to develop.³⁶⁵ This includes Apple's IP portfolio of over 27,000 active granted U.S. patents, over 5,000 U.S. registered copyrights, extensive U.S. registered trademarks, and a trove of valuable trade secrets.³⁶⁶ As described in Section 6.3, IP is particularly susceptible to free riding, and patents and other IP rights serve to restrict free riding and facilitate commercialization of the innovations and discoveries they protect.³⁶⁷ Yet, in the but-for worlds proposed by Plaintiffs' experts, they offer no discussion of how Apple would be compensated for its IP, implying that developers should be able to free ride on the extensive IP portfolio underlying the iOS ecosystem.

190. The Plaintiffs' experts take all of the IP assets and services above for granted in the but-for world. Dr. Economides expects "that in the but-for world, Apple will provide the Apple Developer program to all potential iOS programmers."³⁶⁸ Similarly, Mr. Elhauge argues that, "In the but-for world, none of the rival iOS app distributors would be limited to developers and consumers who violate the contractual restraints and circumvent the technological restraints because those restraints by definition would not exist in the but-for world."³⁶⁹ Dr. McFadden states that it is important for

³⁶² Philip Schiller, Deposition, February 11, 2021, p. 91:18-24.

³⁶³ Trial Transcript, Testimony of Philip Schiller, May 17, 2021, Trial at 2,723:21-25.

³⁶⁴ Schedule 3.3.

³⁶⁵ Schedule 6.0.

³⁶⁶ Section 3.1.

³⁶⁷ "To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy," U.S. *Federal Trade Commission*, October 2003, <https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>, Chapter 2, p. 3.

³⁶⁸ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶70.

³⁶⁹ Expert Report of Professor Einer Elhauge, June 1, 2021, ¶81.

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his “analysis to consider what behavior would not be present in the But-For world,” including “Apple’s Developer Agreement, which app developers must enter before selling apps, forbids them from selling apps to iOS device consumers outside the App Store or creating competing app stores.”³⁷⁰ In other words, the Plaintiffs’ experts appear to assume IP free riding, where Apple will provide its valuable IP to developers without the ability to freely set the terms of any potential license for such IP or compensation for such IP usage. This is marked when considering a for-profit company that has invested billions over the years into IP development and relies on the exercise of its IP rights as one of the foundations of its business and to differentiate itself in a highly competitive industry.

191. Dr. Economides goes on to argue that competing app distribution channels in the but-for world would create their own security solutions and innovations, stating, “[i]ndividual app stores and self-distributing publishers could take it upon themselves to review apps, putting their own reputations on the line to guarantee quality and safety Alternatively, Apple could choose to provide (or require) App Review for all iOS apps entirely separately from distribution. Developers or app stores could contract with a 3rd-party certification provider. Apple could require such 3rd-party certification. Or there could be a mix of all of these options.”³⁷¹ However, Dr. Economides provides no evidence as support for these hypothetical scenarios. Further, he does not explain how individual developers or “3rd-party certification providers” would have the capabilities, resources, or financial incentives to develop and maintain security architecture at the vast scale required to protect the iOS ecosystem. Moreover, third-party stores having their own review mechanisms does not address the fundamental issue that those third parties who “run a store and sell iOS apps”³⁷² nonetheless must have “some connection with the Apple operating system.... Otherwise the....stores will not be able to work.”³⁷³

192. Similarly, Mr. Elhauge contends that, “rival iOS app distributors would provide all the same basic functions that Apple’s iOS app stores provide For example, in Windows app distribution, Steam, the Epic Game Store, and the Microsoft Store all provide: (a) a curated public storefront, (b) secure transfer of the app installation files for the relevant operating system (Windows instead of iOS), and (c) secure financial transactions.”³⁷⁴ In these examples, Mr. Elhauge is taking a narrow

³⁷⁰ Expert Report of Dr. Daniel McFadden, June 1, 2021, ¶123, 125.

³⁷¹ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶16.

³⁷² Nicholas Economides, Deposition, August 4, 2021, p. 110:1-2.

³⁷³ Nicholas Economides, Deposition, August 4, 2021, p. 4-12.

³⁷⁴ Expert Report of Professor Einer Elhauge, June 1, 2021, ¶84.

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and limited view of the IP and services that are provided by Apple to developers and consumers through iOS and the App Store, and says nothing of the hardware and other interrelated elements of the Apple ecosystem.

193. Overall, the Plaintiffs' experts' position that Apple will provide, update, and improve its IP, even as its IP enforcement, licensing, and monetization options are curtailed in a but-for world, has no empirical basis and would make Apple a significant anomaly in the field of IP licensing. IP owners, having accepted the risk, invested in innovation, and obtained patents, copyrights, trademarks, and/or trade secrets, have the right to seek a return on their investment.³⁷⁵ An IP owner does not, however, have an obligation to grant a license to its IP.³⁷⁶

9.3. Conclusions Regarding the Plaintiffs' Experts' Oversight of Apple's IP

194. Plaintiffs' experts fail to recognize that Apple's innovation has been the foundation of its growth and ignore the fact that Apple is not only entitled, but has the right, to seek a return on its IP when it allows others to benefit from its IP pursuant to license agreements. Plaintiffs' experts' failure to acknowledge Apple's innovation and IP rights, and the role they play in Apple's iOS and iPhone features used by apps, the App Store, and Apple's app developer tools and services, casts doubt upon their analyses of the hypothetical world that they contend would exist absent Apple's contested practices.

195. Plaintiffs' experts' lack of consideration for Apple's IP and services, the role which they play in the iOS ecosystem, and the proposals described in the but-for world demonstrate a clear misunderstanding and unawareness of the fundamentals of IP and IP licensing. Artificial limitations on the rights of IP owners to license and be compensated for their IP are in clear tension with the protections, stemming from the U.S. Constitution, that are granted to IP owners and incentivize innovation and continued research and development.

³⁷⁵ "Intellectual Property Strategy and Business Strategy: Connections through Innovation Strategy," Danny Samson, June 2005. Accessed on January 7, 2021, https://www.researchgate.net/publication/228740384_Intellectual_Property_Strategy_and_Business_Strategy_Connections_through_Innovation_Strategy, p. 4.

³⁷⁶ 35 U.S.C. § 271(d)(4).

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10. CONSUMERS AND DEVELOPERS WOULD BE AFFECTED BY PLAINTIFFS' PROPOSED REMEDIES

10.1. Apple's Intellectual Property Compensation Structure Would Change in a But-For World

196. In the but-for world proposed by Plaintiffs' experts, Apple would permit distribution of iOS applications via third-party distribution platforms and direct distribution, and would reduce the App Store commission rate. The Plaintiffs' experts fail to acknowledge, however, that such changes would require Apple to reevaluate and modify its overall Developer Program compensation structure. As described throughout this declaration, Apple manages iOS at the ecosystem level, meaning it does not manage individual components of the ecosystem in a vacuum. Accordingly, restricting or otherwise forcing change to any elements of the ecosystem would necessitate that Apple reassess the overall management and compensation structure of the ecosystem, as the current model was specifically chosen absent such restrictions.

197. Dr. Economides states: "I expect that in the but-for world, Apple will provide the Apple Developer program to all potential iOS programmers," and "[t]o be conservative, I assume that, in the but for world, competition from other distribution methods would not reduce Apple's pricing of its Developer Program, and moreover that developers using other distribution channels would nevertheless value the tools, SDK, and testing provided through the program and would continue to pay the \$99 annually."³⁷⁷ These statements represent a fundamental misunderstanding of how Apple is currently compensated for the collective tools, IP, and services it provides to iOS developers, and mischaracterize the \$99 annual fee as full and complete compensation for the "tools, SDKs, and testing" provided by Apple. These statements also demonstrate a lack of awareness of the economics of intellectual property and technology development, investment, licensing, and monetization.

198. Dr. Economides' statements directly contradict Philip Schiller's deposition testimony; when asked whether the \$99 program fee covers the cost of services provided to developers, Mr. Schiller stated, "I don't think the \$99 program which was not designed to cover any costs, that's not why it exists, could likely come close to covering the costs of all of our engineering, of all of our features and capabilities we provide developers."³⁷⁸ Further, Tim Cook's testimony made clear that the entire current compensation structure, including the commissions, is how Apple generates a return

³⁷⁷ Expert Report of Dr. Nicholas Economides, June 1, 2021, ¶70.

³⁷⁸ Philip Schiller, Deposition, February 11, 2021, pp. 103:25-104:4.

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on its ecosystem of R&D and IP rights. Specifically, Mr. Cook states, “The commission is for a number of different things, from developer tools to the APIs and to the customer service that’s provided,”³⁷⁹ and “Yes. [The commission] provides a return on our – our investment,”³⁸⁰ and “If we allowed people to link out like that, we would in essence give up the – our total return on our IP.”³⁸¹

199. In fact, even the calculations of Consumer Plaintiffs’ expert Daniel McFadden indicate that the total revenue Apple generated from the \$99 membership fees in 2018 was less than \$60M,³⁸² which pales in comparison to the over \$100 billion Apple has spent on R&D since iPhone development began and thus appears to support Mr. Schiller’s testimony that the \$99 developer fees alone would not come close to covering the relevant expenses.³⁸³

200. Despite the claims of Plaintiffs’ experts, it is not plausible to assume that Apple would continue to utilize its current fee structure in the but-for world. In such a world, in which Apple still provides a Developer Program to all iOS developers regardless of whether they distribute via the App Store, Apple would need to modify the Developer Program monetization model to be adequately compensated for its contributions of technology, services, and intellectual property to the program. Without any guarantee of participation in application billings on the backend (due to the proposed allowance of app distribution outside of the App Store), Apple could instead seek more direct compensation for the access/use of its proprietary IP rights, tools, and developer support as a return on its investments and other costs. Apple is entitled to restrict and be compensated for access to its extensive intellectual property rights; disruption of the Company’s current model for doing so could force a shift to an alternate model, which would affect members of the iOS ecosystem differently and likely introduce new challenges for at least some. There is a wide range of options from which Apple could choose to monetize the Developer Program and associated Apple IP. Some examples are provided below, consistent with both my extensive experience with the licensing of intellectual property rights and precedent models within the software application development industry.

201. **Apple could charge a fee for the use of each specific API, developer tool, or software package.** Under such a model, development of more complex or resource-intensive applications

³⁷⁹ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,863:19-21.

³⁸⁰ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,864:5.

³⁸¹ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,988:9-11.

³⁸² Expert Report of Daniel McFadden, June 1, 2021, Figure 6 at ¶36.

³⁸³ Schedule 6.0.

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that rely on a broader set of APIs or developer tools could be significantly more expensive than development of more basic applications. There is precedent for this pricing approach in the game development industry; Unity-based SDK Beamable, which enables developers to add social, commerce, and content management features to Unity games, offers developers two pricing structures: percentage-based revenue share or API usage-based fees (\$99-\$1,999 per million API calls).³⁸⁴

202. Apple could charge separately for bundles of developer tools or functionality. Under this model, developers would have a menu of developer tools and features to choose from and would pay fixed and/or ongoing fees associated with each selection. Third-party examples of this model include Unity, Autodesk, and AppGameKit. Unity, the leading video game development engine with over 50% market share overall³⁸⁵ and over 65% share in mobile game development,³⁸⁶ provides four tiers of subscriptions, and for each tier there are optional add-on tools and functionality available for additional fees.³⁸⁷ Similarly, Autodesk's game design and development software is available as a collection of separately priced packages, each with unique functionality.³⁸⁸ AppGameKit offers another example of this ad hoc pricing model, as it sells both core software bundles as well as add-on products with specific use cases.³⁸⁹ Additionally, software developers' use of Valve Corporation's Source Engine in non-free games can entail specific royalty fees due to third-party contributors to the Source Engine and associated tools, such as a \$25,000 licensing fee due to Havok for the physics engine component of Source, or specific tools provided by RAD Game Tools in the Source SDK.³⁹⁰ These fees are in addition to the [REDACTED]
[REDACTED], generally, described in more detail later in this section.³⁹¹

³⁸⁴ “Beamable Unity C#,” ProgrammableWeb, <https://www.programmableweb.com/sdk/beamable-unity-c>; “Pricing,” Beamable, <https://www.beamable.com/pricing>.

³⁸⁵ “Unity Software Inc.,” Credit Suisse, May 11, 2021, p. 3.

³⁸⁶ Unity Software Inc. Form 10-k, fiscal year ended December 31, 2020, p. 6.

³⁸⁷ “Unity Store,” Unity, <https://store.unity.com/compare-plans>.

³⁸⁸ “Video Game Design and Development,” Autodesk, <https://www.autodesk.com/industry/media-entertainment/game-design-and-development>.

³⁸⁹ “Buy Now,” AppGameKit, <https://www.appgamekit.com/order-studio>.

³⁹⁰ “Distributing Source Engine Games,” Steamworks, https://partner.steamgames.com/doc/sdk/uploading/distributing_source_engine; the predecessor to Havok, IVP, was licensed for \$50,000-\$60,000 per title.

“Havok,” Valve Developer Community, <https://developer.valvesoftware.com/wiki/Havok>.

³⁹¹ “Distributing Source Engine Games,” Steamworks, https://partner.steamgames.com/doc/sdk/uploading/distributing_source_engine; VALVE000675.

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203. **Apple could raise the developer license fee generally.** In order to be compensated upfront for its contributions to the Developer Program, Apple could raise the currently \$99 annual fee to offset the loss of backend commissions in the but-for world. In an article geared towards software and technology hardware businesses, consulting firm McKinsey & Company highlights the tradeoff nature of “migrating your business from an up-front to a recurring-revenue model.”³⁹² The inverse would be an available option to Apple in the proposed but-for world, in that Apple may switch from a recurring/backend model to a more predominately upfront one. While the exact price change Apple would enact under this structure is unknown, it could be a substantial increase from \$99 given the relatively small share of total App Store revenue the annual fees currently provide.³⁹³ By way of example, the Enterprise Program currently has a \$299 annual subscription fee. However, like the \$99 fee, the Enterprise Program fee is not designed to offset costs for providing the Developer Program, generally.³⁹⁴ In both cases, developers are paying modest fees and adding value to the ecosystem. Apple’s current models are managed and designed at the ecosystem level and are not structured to precisely extract compensation from each developer commensurate with the Apple technology the developer is using, and therefore the current annual fee pricing of either program is not predictive of what Apple may charge in a but-for world.

204. **Apple could introduce a developer revenue-based royalty.** This approach would assess a royalty on a developer’s revenue across the entire iOS ecosystem, rather than a revenue share specific to the App Store. Currently, based on a recently published study, App Store developers generated upwards of \$640 billion in iOS ecosystem-related revenues globally in 2020.³⁹⁵ Further, more than \$550 billion (85%+) of these revenues were not subject to the current App Store commission structure, but could be subject to an alternative gross revenue-based royalty structure. A revenue-based royalty of this nature, where a licensor receives a portion of all revenue derived from the licensed IP (what Apple provides pursuant to licenses with developers, including the Developer Program License Agreement), is a fundamental and widespread approach to IP licensing, generally, and has precedent in the app development industry. Specifically, the plaintiff against Apple in a concurrent matter before this Court, Epic Games, employs this precise model for the license of its Unreal Engine. Epic assesses a royalty on the **gross** revenues of app developers, including revenue from advertising, transactions, subscriptions, crowdfunding, and more,

³⁹² “Subscription myth busters: What it takes to shift to a recurring-revenue model for hardware and software,” McKinsey & Company, <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/subscription-myth-busters>.

³⁹³ Expert Report of Daniel McFadden, June 1, 2021, Figure 6 at ¶36.

³⁹⁴ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,858:18.

³⁹⁵ “A Global Perspective on the Apple App Store Ecosystem,” Analysis Group, June 2021, p. 2.

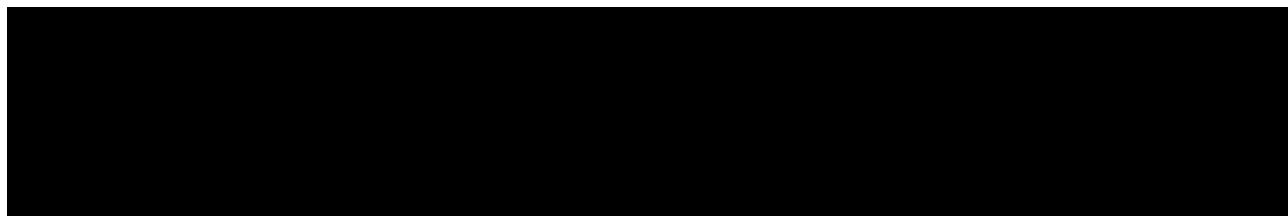
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irrespective of any commissions due to third parties (e.g., application marketplaces).³⁹⁶ When asked at trial whether the intent of the Unreal Engine license agreement was “because Unreal Engine and the Epic entity that owns it wish to protect and retain their IP rights, correct?”, Epic Games representative Andrew Grant testified “Yes.”³⁹⁷ Valve Corporation, video game developer and operator of popular Steam application marketplace, also charges a revenue-based royalty for use of its engine and developer technologies. Specifically, Valve charges [REDACTED]

[REDACTED]³⁹⁸ The example provided by a group of technical, financial, and legal Valve employees illustrates the payout structure for a game that uses the Source Engine and Source Assets, shown below. No royalties are assessed on content distributed for free.³⁹⁹

Figure 17: Valve Technology Licensing and Distribution Example⁴⁰⁰



205. **Apple could implement a tiered structure of developer licenses.** Such a structure would include varying the fee structure based on the level of Apple IP and developer support tools available to each tier. One example of such a structure in the game development space is Unity, which offers multiple subscription tiers (Personal, Plus, Pro, and Enterprise), each of which includes a unique bundle of services and functionality.⁴⁰¹ Other game development examples include YoYo Games, which has subscription tiers that vary in price and platform compatibility (e.g., Mac,

³⁹⁶ Trial Transcript, Testimony of Andrew Grant, May 5, 2021, Trial at 754:20-756:17; Unreal Engine End User License Agreement, *Epic Games Inc. v. Apple, Inc.* trial exhibit DX-4022; the Unreal Engine royalty is waived for revenues generated through the Epic Games store, for which Epic retains a 12% commission.

³⁹⁷ Trial Transcript, Testimony of Andrew Grant, May 5, 2021, Trial at 754:17-19.

³⁹⁸ VALVE000675.

³⁹⁹ “Distributing Source Engine Games,” Steamworks, https://partner.steamgames.com/doc/sdk/uploading/distributing_source_engine.

⁴⁰⁰ VALVE000675.

⁴⁰¹ “Unity Store,” Unity, <https://store.unity.com/compare-plans>.

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Windows, mobile, consoles), and Buildbox 3, which offers three subscription tiers with unique storage allotments, functionality, and advertising revenue allocations.⁴⁰²

206. Apple could vary fee terms based on the size or other characteristics of a particular developer. For instance, certain program tiers or pricing terms could be restricted based on the financial characteristics of a developer. The Unity platform implements this approach as well; the availability of Unity subscription tiers is limited by the amount of “revenue or funding” received by a developer in the past 12 months (current thresholds being \$100,000 and \$200,000).⁴⁰³ Game development software provider Construct takes a similar approach, where qualification for its three license options (Startup, Business, or Gambling) depends on a developer’s revenue, net assets, and business focus.⁴⁰⁴ Note, Apple currently implements some form of this approach via the reduced commissions available through the Small Developer Program, Video Partner Program, and subscription program, as described in Section 7.4.2.

207. Ultimately, Apple’s available options are many, and the selection of an alternate Developer Program compensation structure would depend on the specific circumstances of the but-for world and the discretion of management. The selected model may be a variant or combination of the models described here, or a different model altogether. In addition to those described above, other common IP licensing compensation mechanisms include upfront license payments, milestone payments, annual minimum royalties, and royalty rates that change over time or change based on performance (e.g., units or revenue levels), among others. A consistent result of many of the alternative structures is an increase in friction and transaction costs, such as the costs of tracking, recording, and paying royalties, or compliance with the audits necessary for the successful function of a model that is not based on a revenue stream Apple observes directly.

10.2. Proposed Developer Class Members and Non-Members Would be Affected Differently in the But-For Worlds Proposed by Plaintiff’s Experts

208. Any alternative compensation structures selected by Apple would, without a doubt, change the costs and risks individual iOS developers face, including both members and non-members of the proposed class. Some alternate structures would drive up the overall cost of development for many,

⁴⁰² “Product Choice,” YoYo Games, <https://www.yoyogames.com/en/get>; “Buildbox 3,” Buildbox, <https://signup.buildbox.com/plans>.

⁴⁰³ “Unity Store,” Unity, <https://store.unity.com/compare-plans>.

⁴⁰⁴ “Buy Business Licenses,” Construct, <https://www.construct.net/en/make-games/buy-construct-3/business-plans>.

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while bringing costs down for the highest earning developers. Others would shift the majority of development costs from the backend to upfront, effectively raising barriers to entry and increasing developers' financial risk relative to the status quo. As one example, as mentioned earlier, approximately 85% of developers' iOS ecosystem-related revenues globally are currently not subject to the App Store commission structure, but those revenues could be impacted by an alternative compensation structure.⁴⁰⁵ Such changes would affect each developer differently based on their specific circumstances, resulting in groups of "winners," "losers," and relatively unaffected parties among both members and non-members of the proposed class. Some likely ramifications from the potential but-for world compensation structure changes are described below, including examples of their unique impact on certain developers.

209. Developers might abandon iOS. Any monetization structure change that increases the cost of development would discourage some new developers from pursuing the iOS platform and drive away some existing iOS developers. For example, changes that introduce higher upfront fees (e.g., upfront license fees or paid access to specific developer tools) would mean new barriers to entry for developers, discouraging or prohibiting some from joining the iOS ecosystem at all. Across the spectrum of developers, from free apps, to ad-supported apps, to transactional apps, higher development costs would drive some developers, including proposed class members and non-members, to leave iOS altogether.

210. Developers might cease use of beneficial Apple tools, IP, and APIs. If Apple were to implement a usage-based fee system, ad hoc technology bundle pricing, or tiered subscription options, developers would be faced with a choice: pay more to use more tools, IP, and technology, or pay less by minimizing such usage. While the specific cost-benefit tradeoff would be developer-specific, at the ecosystem level it would discourage the use of more sophisticated, IP-rich technology Apple provides. Instead of focusing on developing the best applications possible using the optimal combination of the 150,000 iOS APIs⁴⁰⁶ Apple provides, some developers would instead forego certain features or implement sub-optimal workarounds in the interest of controlling cost. This cost-benefit tradeoff decision and its downstream ramifications would affect developers of free and paid applications across application categories, but the extent of the effect would vary based on the size, resources, and IP usage characteristics of individual developers.

⁴⁰⁵ "A Global Perspective on the Apple App Store Ecosystem," Analysis Group, June 2021, p. 2.

⁴⁰⁶ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,989:10.

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211. **Developer innovation might wane.** The status quo encourages developer innovation in that it allows free, unrestricted access to the full suite of tools and technologies provided by Apple. As described above, developers are able to focus on developing the best applications possible using the combination of Apple tools and technologies they deem optimal, without regard for controlling costs or technology usage. Under the potential alternate compensation models, however, developer innovation is likely to wane. For instance, under a model in which Apple charges for specific tools and functionality, newly released Apple features and APIs resulting from costly R&D would likely carry a high price tag. This cost to developers would dissuade exploration and implementation of such new technologies, disabling the type of open technical innovation developers enjoy under the current Developer Program model.

212. **Developers might raise prices.** In response to increased development costs or licensing fees, those developers who do not leave iOS completely may respond with application price increases. Such increases would harm the iOS ecosystem generally by driving up consumer costs. Further, a price increase for any given application would impair demand for other paid applications, particularly when consumers have fixed application spending budgets. Such pricing pressure on consumers would unilaterally harm developers of fee-based applications, while less significantly affecting any developers of free or ad-supported applications.

213. **Developers might charge for currently free applications.** In addition to raising the costs of existing paid applications, developers may be forced to start charging for currently free applications in the face of higher development costs. Currently, developers of free or ad-supported applications pay only the \$99 annual fee in exchange for full access to the Developer Program benefits and distribution on the App Store. And approximately █ of apps were offered to consumers for free in FY2020.⁴⁰⁷ If Apple were to adopt a new model that predominantly charges developers upfront for access to developer tools or on an API-usage basis, the development cost of such free applications could increase dramatically. Affected developers may respond by leaving iOS as previously noted, but could also start charging for their previously free applications. Apple CEO Tim Cook articulated the benefits of free applications to App Store developers when he testified, “the way that I look at that, Your Honor, is that by having such a large number of apps that are free on the store, it increases traffic to the store dramatically. And so the benefit somebody gets that’s charging is they get a much higher audience to – to sell to than they would otherwise if there weren’t free apps there.”⁴⁰⁸ Accordingly, a decrease in the number of free apps available to consumers

⁴⁰⁷ Expert Report of Lorin Hitt, August 10, 2021, ¶48.

⁴⁰⁸ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,988:24-25, 3,989:1-5.

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would adversely affect all App Store developers. Additionally, as noted above, charges for currently free applications would reduce consumers' available budgets for spending on other applications, to the particular detriment of developers of paid or IAP-supported applications.

214. Developers might introduce advertising in currently ad-free applications. A potential result of rising application development costs is the increased use of advertising by developers to offset such costs. While it is established in the application development industry that "using mobile application ads can pay back the cost of development over time,"⁴⁰⁹ a heavy reliance on advertising could be at the detriment of user experience and, ultimately, the success of application monetization efforts.⁴¹⁰ Such user experience harm may be particularly pronounced if a currently ad-free application begins serving in-app ads to existing users.

215. Small developers might be disadvantaged. Any of the aforementioned Developer Program compensation structure changes that increase upfront development costs would disproportionately disadvantage small developers. Small or startup developers are less likely than their peers to have access to substantial capital prior to generating revenue from their applications. So high upfront costs would preclude some of these developers from building their applications in the first place. Apple currently recognizes such differences in ability to pay via the Small Developer Program, but beyond that the current revenue share structure itself is advantageous to resource-constrained developers in that it only requires fees to Apple when an application is generating revenue. In addition to the direct disadvantage to small developers of higher upfront fees, the resulting exodus of small developers from the ecosystem would harm developers generally by reducing the available selection and variety of applications, degrading the consumer experience, and likely reducing App Store traffic.

216. Large developers might be advantaged or disadvantaged. Contrary to the detriment to small developers, any shift from a backend sharing based compensation model to an upfront fee based model would likely be advantageous to the largest and highest earning developers. Such upfront fees, which would likely be applicable to broad groups of developers, are highly likely to be less than the commissions currently paid by the highest earning application developers. On the other hand, a transition to an API or software usage-based pricing model may be at the detriment to

⁴⁰⁹ "Use Mobile Application Ads to Monetise Your App Project," Intelligent Profit Solutions, <https://www.intelligentprofitsolutions.com/blog/ips-blog/use-mobile-application-ads-to-monetise-your-app-project>.

⁴¹⁰ "Best Guide To Mobile App Monetization 2021 – Stats, Strategies & Insight," Tamoco, https://www.tamoco.com/blog/ultimate-app-monetization-guide/#In-app_advertising.

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large developers with high numbers of active users, frequent API calls, and broad implementation of developer tools, as they would be paying based on usage regardless of the corresponding revenue they generate.

217. **Developers might face higher financial risk when developing for iOS.** As a result of potential higher and front-loaded development costs, which aren't tied to application success, developers would face a risk of financial loss they don't currently face. For example, if a small developer must pay all or most of the development costs upfront, but their application ultimately is unsuccessful at generating revenue, they would be unable to recoup their development investment. By contrast, under the current model, developers risk only the \$99 annual fee when developing applications, and by definition, only pay additional fees to Apple that are less than the revenue they generate.

218. It is important to note that the above effects on developers and resulting developer reactions would be developer-specific or application-specific, and would vary significantly across and within application categories. For example, in an API-usage based fee model, developers of complex, API-rich applications, such as high graphics video games, would be affected to an entirely different degree than developers of simple text-based games that rely on a relatively small number of APIs. The same disparity would exist between application categories as well, in that differences in the specific API or software usage, revenue models, or profitability common in an application category would dictate the extent to which developers in that category are affected by the but-for world changes. Accordingly, there would be a spectrum of outcomes for developers generally, where some would be disadvantaged, others would be affected minimally, and others still may benefit from the changes. These winner and loser groups would emerge among both members and non-members of the proposed class. The three specific developer examples below serve to illustrate the variety of impact developers, whether a member of the proposed class or not, would experience under potential Developer Program compensation structure changes in the but-for world.

- **Zynga, Inc.** ("Zynga"), proposed class member and developer of gaming apps such as Words with Friends, Solitaire, Zynga Poker, and other popular iOS applications,⁴¹¹ is one of the highest grossing iOS developers, with [REDACTED] of dollars of App Store revenue over the proposed class period.⁴¹² Due to the high revenues generated by Zynga,

⁴¹¹ "Zynga Inc.," Apple, <https://apps.apple.com/us/developer/zynga-inc/id295913422>.

⁴¹² App Store transaction data produced by Apple (through September 2019), as summarized in "ELOC815 top iOS developer by revenue.csv."

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the developer would likely benefit if the Developer Program compensation structure shifted away from backend revenue sharing in favor of a higher upfront program fee. In particular, any upfront fee designed to apply to a broad swath of developers is likely lower than the commissions currently paid by top earning developers like Zynga. On the other hand, if the Developer Program were to be monetized on a usage basis, such as a fee per API call, Zynga's millions of users across numerous applications may drive substantial usage-based costs, which could be higher than commissions paid under the current structure, depending on specific usage pricing.

- **Spectrum Visions LLC** (“Spectrum”), a proposed class member and developer of communication apps such as augmentative and alternative communication (“AAC”) application Voice4u AAC, has generated [REDACTED] ⁴¹³ For developers like Spectrum, a transition to a higher upfront fee structure or paid access to certain iOS technologies could be cost-prohibitive and/or discourage iOS development completely. Voice4u AAC, which costs \$59.99 plus optional IAP,⁴¹⁴ is an example of an application with a very specific target audience, in this case users with speech challenges, and therefore is not intended or likely to achieve millions of downloads or App Store revenue. Yet the application, and those like it, is critically important to its users, as it enables audible communication that would otherwise be difficult or impossible. In the Plaintiffs’ experts’ proposed but-for world, the necessary restructuring of the Apple Developer Program compensation model could discourage development of such high-value, niche user base applications, or could drive their developers to raise consumer prices or remove certain functionality.
- **Wells Fargo Bank** (“Wells Fargo”), developer of the Wells Fargo Mobile banking app,⁴¹⁵ provides the application for free. Instead of monetization, the purpose of the application, and many like it, is as a convenience for the developer’s existing customers. Under the existing Developer Program model, developers like Wells Fargo pay nothing beyond a \$99 annual program fee. The aforementioned alternative Developer Program structures, however, could introduce significant costs to the provision of this application. For instance,

⁴¹³ App Store transaction data produced by Apple (through September 2019), as summarized in “ELOC815 top iOS developer by revenue.csv.”

⁴¹⁴ “Voice4u AAC,” Apple, <https://apps.apple.com/us/app/voice4u-aac/id339916109>.

⁴¹⁵ “Wells Fargo Mobile,” Apple, <https://apps.apple.com/us/app/wells-fargo-mobile/id311548709>.

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paid access to certain APIs or features, such as FaceID, would drive up application development costs or encourage Wells Fargo to remove such functionality to avoid the costs. All current developers of convenience-focused, non-monetized apps, like Wells Fargo Mobile, have determined the \$99 cost to be less than the benefit the application provides to their constituents and businesses. But for each such developer, at some party-specific cost level higher than \$99, the cost-benefit tradeoff no longer makes sense, inciting removal or monetization of these free, convenience-focused applications. And while a large corporation like Wells Fargo is equipped to weather cost increases of this nature, the same may not be true for public libraries, nonprofits, or community organizations who provide free iOS apps for a similar, convenience-based purpose.

10.3. Proposed Consumer Class Members and Non-Members Would be Affected Differently in the But-For Worlds Proposed by Plaintiff's Experts

219. Alternative IP and developer tool compensation structures would uniquely affect App Store consumers as well, on a consumer-by-consumer basis, including both proposed class members and non-members. Dr. Elhauge opines: “The majority (58%) of iOS device users never make a purchase on the App Store that results in a commission for Apple,” and are therefore excluded from the proposed class.⁴¹⁶ However, despite this majority of iOS users being excluded from the proposed class, such users would be affected by the proposed but-for world, in some cases in more significant or conflicting ways than the proposed class members the but-for world is purported to benefit. In particular, in the but-for world iOS consumers would likely face some combination of higher application costs, reduced consumer choice, a weakened iOS ecosystem, and impairment to the user experience, as described further below. It is important to note, however, that the particular ramifications felt by consumers would vary significantly and could be positive or negative depending on an individual consumer’s application preferences and habits.

220. **Prices charged to consumers for applications might increase.** As articulated above, developers facing higher upfront costs of development, such as higher annual fees and/or upfront license fees for certain tools/APIs, may respond by increasing application prices or by requiring users to purchase applications that otherwise would have been free. This would be to the detriment of consumers, generally, but especially to the more fee-conscious or budget-constrained iOS users.

⁴¹⁶ Expert Report of Einer Elhauge, June 1, 2021, ¶419.

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221. **Consumers might see a smaller selection of applications.** As described above, potential ramifications of modifying the Developer Program compensation structure include discouraging iOS development generally, discouraging the use of IP-rich Apple technology, and the introduction of higher barriers to entry for developers. These effects would reduce consumers' (including both members and non-members of the proposed class) available selection of applications and/or the quality of available applications. However, the extent of the effects would vary depending on the particular consumer's application habits. For example, consumers of only the largest, most popular applications likely would feel less of a change, as the developers of such applications are less likely to be part of an exodus from iOS. Meanwhile, consumers of applications from smaller developers or thinly funded applications likely would experience more pronounced negative effects of the underlying changes.

222. **Consumers might have reduced access to or reduced benefits from new technology developments.** As described above, a pricing model based on usage or access to specific technologies would require developers to pay more to implement and innovate around newly developed Apple features and technologies. These additional costs would disincentivize such use of new or technically advanced technologies, and the developers who still choose to implement them may need to pass along such costs to consumers. Ultimately, under such a system, consumers either would not have access to the features due to low implementation or would have to pay more to use applications that implement the innovations.

223. **The iOS ecosystem and its benefits could shrink.** Many of the aforementioned potential ramifications would harm the iOS ecosystem overall, particularly those that drive away developers or degrade the consumer experience. Such effects may be cyclical in that a reduced customer experience may enable higher user turnover, decreasing the available audience for applications, further demotivating application development, etc.

224. Ultimately, the specific effects of the but-for world on consumers would vary on a consumer-by-consumer basis. The aforementioned but-for world Developer Program compensation structure changes may have negative effects on some consumers, such as higher application costs, reduced application selection, more in-app advertising, and a degraded iOS ecosystem. On the other hand, some consumers may see price decreases in their favorite applications, particularly for applications developed by large developers who may benefit from the potential compensation structure changes. Whether a given consumer would see a net benefit, net detriment, or a relatively neutral outcome is not predicted by their membership in the proposed

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class, but is instead specific to their unique consumption habits and the relevant reactions of the particular developers with which they interact.

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11. PLAINTIFFS' EXPERTS' PROFITABILITY ANALYSIS IS FLAWED

225. Apple, as a publicly traded company, provides quarterly and annual audited financial statements in a standardized format compliant with GAAP. The reporting segmentation of these financial statements adheres to the Management Approach within GAAP, meaning they align with how management views and makes decisions about the business. Apple manages its business as an interrelated ecosystem of products and services, with GAAP reporting segments based on geography rather than business line. Plaintiffs' experts' accounting estimates are flawed because they (1) ignore Generally Accepted Accounting Principles, (2) reflect a mischaracterization of Apple's business practices and, accordingly, the level at which Apple collects and reports its financial performance, and (3) rely on economically arbitrary methods to allocate inseparable joint costs. Accordingly, their purported calculations of App Store operating margin are arbitrary and unreliable.

11.1. Generally Accepted Accounting Principles Create a Consistent Standard for Financial Reporting

11.1.1. Overview of Generally Accepted Accounting Principles

226. Generally Accepted Accounting Principles are the rules and guidelines that companies commonly follow when reporting financial data, and the ultimate goal of such principles is to ensure that a company's financial statements are complete, consistent, and comparable.⁴¹⁷ In the United States, the Financial Accounting Standards Board ("FASB"), a not-for-profit organization, establishes the financial accounting and reporting standards that comprise Generally Accepted Accounting Principles. The FASB is recognized by the U.S. Securities and Exchange Commission as the designated accounting standards setter for public companies.⁴¹⁸ To be listed on a public stock exchange in the United States, companies are required to file audited, GAAP-compliant financial statements with the U.S. Securities and Exchange Commission ("SEC").⁴¹⁹ Within GAAP, FASB Accounting Standards Codification ("ASC") 280 – Segment Reporting governs the level of financial disclosure necessary, and a fundamental principal of ASC 280 is the requirement that a company's financial disclosures be consistent with management's reporting structure to allow users to "see

⁴¹⁷ "US GAAP: Generally Accepted Accounting Principles," *CFA Institute*, <https://www.cfainstitute.org/en/advocacy/issues/gaap>.

⁴¹⁸ "About the FASB," *Financial Accounting Standards Board*, Updated July 2020, <https://www.fasb.org/facts/>.

⁴¹⁹ "All About Auditors: What Investors Need to Know," *U.S. Securities and Exchange Commission*, <https://www.sec.gov/reportspubs/investor-publications/investorpubsaboutauditorshtm.html>.

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through the eyes of management” and help users make informed judgments about the entity as a whole.⁴²⁰

227. While GAAP requires public companies to present certain enterprise level information, including revenues related to products and services regardless of how the entity is organized, under the ASC-defined “Management Approach,” a company is required to disclose segment financial information in a manner consistent with management’s review of performance and decision making.⁴²¹ In particular, the Management Approach designates the internal reporting used by management as the basis for the Company’s reportable segments.⁴²² The Management Approach focuses on financial information that a company’s decision makers use to make decisions about operating matters; and the operating categories of the business that management establishes for that purpose are called operating segments.⁴²³

228. The FASB believes the Management Approach to be the preferred form of presentation for the following reasons:⁴²⁴

- The management approach is based on an entity’s internal organization, which highlights the risks and opportunities that management believes are important and allows users to assess the performance of individual operating segments in the same way that management reviews performance and makes decisions;
- The management approach provides users with the opportunity to see the entity from management’s vantage point and enhances users’ ability to predict actions or reactions of management that can significantly affect the entity’s prospects for future cash flows;
- Because the information is already generated for management’s use, the incremental cost of reporting segment information should be relatively low; management should not need to prepare any new reports to comply with the segment disclosure requirements; and

⁴²⁰ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, pp. 1, 5.

⁴²¹ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, pp. 2, 3.

⁴²² Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

⁴²³ FASB ASC 280-10-05-4 Segment Reporting – *Overall Overview and Background General*

⁴²⁴ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, p. 2.

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- Segment reporting under the management approach is consistent with other significant sections of an entity's annual report, such as the business review section and the chairman's letter. These sections of the annual report usually describe the company's businesses the way that management views and runs these businesses, which is how segment information is presented under the Management Approach.

229. The focus of segment reporting using the Management Approach is to allow users to “see through the eyes of management” and make informed judgments about the **entity as a whole**.⁴²⁵ Accordingly, the level and usefulness of financial data at operating categories below the consolidated level will flow from management’s perspective and approach to the management of the business.

11.1.2. Segment Disclosure Reflects Management’s View of the Business

230. For a business category to be classified as an operating segment under the Management Approach it must meet three separate criteria. First, the category must engage in business activities from which it may recognize revenues and incur expenses.⁴²⁶

231. Second, the operating results of the category must be reviewed regularly by the chief operating decision maker (the “CODM”). Specifically, the CODM must assess operating performance and make key operating decisions based on the financial information of the category.⁴²⁷ The CODM is the individual or group within an organization that is responsible for the allocation of resources and the assessment of the operating results of the operating segments.⁴²⁸

232. Lastly, to be an operating segment, discrete financial information must be available for the CODM to assess performance and allocate resources. That financial information provides the basis for operating segment determination and reporting. However, it need not include a complete allocation of operating costs and assets.⁴²⁹

⁴²⁵ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, p. 2.

⁴²⁶ FASB Accounting Standards Codification ASC 280-10-50-2.1.1 through ASC 280-10-50-2.1.3.

⁴²⁷ Ibid

⁴²⁸ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, p. 12.

⁴²⁹ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, pp. 11-12.

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11.1.3. Apple's Audited Financial Statements are GAAP-Compliant

233. As a public company traded on the NASDAQ, Apple reports its financial statements in accordance with GAAP.⁴³⁰ Specifically, Apple discloses GAAP-compliant audited financial statements quarterly in its Form 10-Q Quarterly Report (“10-Q”) and annually in its Form 10-K Annual Report (“10-K”). Apple’s financial statements, including the company’s segment reporting, are audited by Ernst & Young and have received an unqualified audit opinion. An unqualified opinion is an independent auditor’s judgment that a company’s financial statements are fairly and appropriately presented, without any identified exceptions, and in compliance with GAAP. Mr. Tregillis has reviewed and considered Apple’s public financial reporting and he neither suggests nor infers that Apple’s financial reporting is inconsistent with GAAP.⁴³¹

11.1.4. Apple’s Reporting Segments are Based on Geography and Apple Does Not Allocate Joint R&D and Corporate Expenses to the Reporting Segments

234. In accordance with GAAP, Apple reports segment information based on the ASC-defined Management Approach, meaning it discloses financial information in a manner consistent with management’s review of performance and decision making.

235. The following excerpt from Apple’s 2020 10-K filed with the Securities and Exchange Commission provides an overview of key accounting policies, and detail regarding the Company’s segment reporting and disclosure:

⁴³⁰ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, pp. 17, 27.

⁴³¹ Expert Report of Christian Tregillis, June 1, 2021, ¶¶9-14, 19-26, 34-37, 47-50, 77-80.

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The Company reports segment information based on the “management” approach.

The Company manages its business primarily on a geographic basis. **The Company’s reportable segments consist of the Americas, Europe, Greater China, Japan and Rest of Asia Pacific.**

Although the reportable segments provide similar hardware and software products and similar services, each one is managed separately to better align with the location of the Company’s customers and distribution partners and the unique market dynamics of each geographic region.

The Company evaluates the performance of its reportable segments based on net sales and operating income Operating income for each segment includes net sales to third parties, related cost of sales and **operating expenses directly attributable to the segment.** Advertising expenses are generally included in the geographic segment in which the expenditures are incurred.

Operating income for each segment excludes other income and expense and certain expenses managed outside the reportable segments.

Costs excluded from segment operating income include various corporate expenses such as research and development, corporate marketing expenses, certain share-based compensation expenses, income taxes, various nonrecurring charges and other separately managed general and administrative costs.⁴³²

236. Apple views and manages its operations geographically, and it discloses segment information for the geographies in which it operates, as well as consolidated company-wide financial information.⁴³³ The Company’s reportable segments consist of the Americas, Europe, Greater China, Japan, and Rest of Asia Pacific.⁴³⁴

⁴³² Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55 (emphasis added).

⁴³³ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

⁴³⁴ Ibid

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237. Apple's financial reporting disclosures reflect the risks and opportunities that Apple's management believe to be important and allow users to assess the performance of the overall business. The Company's segment reporting reflects the fact that management views the Company as a cross-functional, interrelated ecosystem of Apple's products and services (referred to in the Company's 10-K as "Products & Services"). As Apple Finance Manager Mark Rollins testified, "Apple isn't structured, for example, in a business unit function. Apple is structured in a functional unit. And so as a result of that, as part of Apple's, you know, general philosophy that the purpose of Apple's products and services is really part of an ecosystem," and "the way that Apple thinks about it is more at a higher level in terms of its ecosystem. And so the value of all of our products and services are sort of taken as a whole."⁴³⁵ Philip Schiller testified for instance, that the cost of developing APIs has never been allocated to the App Store.⁴³⁶ Further, Apple CEO Tim Cook testified that Apple does not consider any other profit margin besides that of the aggregate company when running the business, and does not prepare fully-burdened P&L statements for business units.⁴³⁷ Instead, per Apple's SEC filings, it manages the business geographically with the costs and benefits shared throughout the ecosystem. Apple does not allocate joint costs such as R&D and corporate overhead. The cost of developing and maintaining the IP in Apple's Products & Services ecosystem is shared and inseparable. There is no economically meaningful way for management to allocate costs such as R&D between Apple's Products & Services operating categories and this is consistent with the Company's financial reporting.⁴³⁸ Moreover, Apple does not publicly disclose financial data that purports to allocate costs between operating categories or otherwise purports to report the financial performance of "business units" on a standalone basis because it does not manage its business in that way.

238. Apple's geographic segment reporting is consistent with Apple's view of iOS as a cross-functional ecosystem supported by joint costs and teams across the company; it manages the business geographically with the costs and benefits shared throughout the ecosystem. Although Apple includes a high-level breakout of revenues and gross margins for the Products & Services categories of the business, these are **not reportable segments** and therefore are not viewed at the operating profitability level.

⁴³⁵ Mark Rollins, Deposition, February 11, 2021, pp. 78:8-79:4.

⁴³⁶ Trial Transcript, Testimony of Philip Schiller, May 17, 2021, Trial at 2,733:3-5.

⁴³⁷ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:16-23.

⁴³⁸ Trial Transcript, Testimony of Matthew Fischer, May 6, 2021, Trial at 923:4-10.

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11.2. Mr. Tregillis Ignores GAAP and Incorrectly Identifies Product Sales Data as Reporting Segments

239. Plaintiffs' expert, Mr. Tregillis, incorrectly claims that Apple manages and segments its business by Products & Services and implies that detailed, fully-burdened, standalone data must therefore be available for each of the identified Products & Services categories, including the App Store. Mr. Tregillis' claims are unfounded.

240. Mr. Tregillis incorrectly points to the enterprise level Products & Services descriptions and revenues detail provided in Apple's 10-K and mischaracterizes them as "business units" or "segments." For example, Mr. Tregillis incorrectly claims that Apple "reports its financial performance in five business segments," iPhone; Mac; iPad; Wearables, Home, and Accessories; and Services. Mr. Tregillis even uses the term "segment" while simultaneously citing a table excerpted from the Company's financial statements titled "Products and Services Performance."⁴³⁹ Mr. Tregillis' use of the accounting term "segment" to describe the Company's Products & Services is not only misleading, but also an error that renders his entire analysis fundamentally flawed.

241. As noted in detail above, Apple follows the Management Approach in determining its reportable segments in accordance with GAAP. As Apple clearly states, in the same 10-K document cited by Mr. Tregillis, "[t]he Company manages its business primarily on a geographic basis. The Company's reportable segments consist of the Americas, Europe, Greater China, Japan, and Rest of Asia Pacific."⁴⁴⁰ Mr. Tregillis takes no issue with the Company's segment reporting as disclosed in its public financial statements, yet he incorrectly identifies entity-wide Products & Services performance data as "segments."

242. In accordance with GAAP, public companies must also present certain entity-wide information, including revenues related to products and services, regardless of how the business is organized or segmented.⁴⁴¹ These disclosure requirements are based on company-wide data, and they are independent of management's reporting unit and segment identification. Mr. Tregillis' identification of Apple's entity-level Products & Services disclosures as "business units" and "segments" is misleading because it attempts to confuse entity-level, GAAP disclosures regarding

⁴³⁹ Expert Report of Christian Tregillis, June 1, 2021, ¶13, 33.

⁴⁴⁰ Expert Report of Christian Tregillis, June 1, 2021, ¶13, 23-46; Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

⁴⁴¹ Ernst & Young "Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280," revised April 2020, p. 5.

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Products & Services with the business/reporting unit and segment level disclosures that are based on the way management reviews operating performance and makes decision.

243. The following excerpt from Apple's fiscal year ended September 2020 correctly shows the reporting segments, revenues, and earnings disclosed by Apple.

Figure 18: Excerpt from Apple 10-K Discussing Segment Reporting⁴⁴²

Note 11 – Segment Information and Geographic Data

The Company reports segment information based on the "management" approach. The management approach designates the internal reporting used by management for making decisions and assessing performance as the source of the Company's reportable segments.

The Company manages its business primarily on a geographic basis. The Company's reportable segments consist of the Americas, Europe, Greater China, Japan and Rest of Asia Pacific. Americas includes both North and South America. Europe includes European countries, as well as India, the Middle East and Africa. Greater China includes China mainland, Hong Kong and Taiwan. Rest of Asia Pacific includes Australia and those Asian countries not included in the Company's other reportable segments. Although the reportable segments provide similar hardware and software products and similar services, each one is managed separately to better align with the location of the Company's customers and distribution partners and the unique market dynamics of each geographic region. The accounting policies of the various segments are the same as those described in Note 1, "Summary of Significant Accounting Policies."

The Company evaluates the performance of its reportable segments based on net sales and operating income. Net sales for geographic segments are generally based on the location of customers and sales through the Company's retail stores located in those geographic locations. Operating income for each segment includes net sales to third parties, related cost of sales and operating expenses directly attributable to the segment. Advertising expenses are generally included in the geographic segment in which the expenditures are incurred. Operating income for each segment excludes other income and expense and certain expenses managed outside the reportable segments. Costs excluded from segment operating income include various corporate expenses such as research and development, corporate marketing expenses, certain share-based compensation expenses, income taxes, various nonrecurring charges and other separately managed general and administrative costs. The Company does not include intercompany transfers between segments for management reporting purposes.

The following table shows information by reportable segment for 2020, 2019 and 2018 (in millions):

	2020	2019	2018
Americas:			
Net sales	\$ 124,556	\$ 116,914	\$ 112,093
Operating income	\$ 37,722	\$ 35,099	\$ 34,864
Europe:			
Net sales	\$ 68,640	\$ 60,288	\$ 62,420
Operating income	\$ 22,170	\$ 19,195	\$ 19,955
Greater China:			
Net sales	\$ 40,308	\$ 43,678	\$ 51,942
Operating income	\$ 15,261	\$ 16,232	\$ 19,742
Japan:			
Net sales	\$ 21,418	\$ 21,506	\$ 21,733
Operating income	\$ 9,279	\$ 9,369	\$ 9,500
Rest of Asia Pacific:			
Net sales	\$ 19,593	\$ 17,788	\$ 17,407
Operating income	\$ 6,808	\$ 6,055	\$ 6,181

⁴⁴² Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

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244. Mr. Tregillis' inaccurate characterization of Apple's entity level Products & Services revenue disclosure as the Company's operating segments is important, as it forms the foundation of his flawed narrative and conclusions. Because he incorrectly assumes that the Company's management and CODM review operating performance at the Products & Services category level; he also incorrectly assumes that fully-burdened⁴⁴³ GAAP financial information is or must be available for each of the Company's Products & Services categories, and specifically, the App Store.

245. Mr. Tregillis' conclusion is incorrect on multiple levels. He ignores the fact that GAAP does not require public entities to report fully-burdened operating performance data. As discussed above, the Management Approach only requires management to report information in a manner consistent with the way management internally evaluates performance. Moreover, he ignores the fact that Apple's 10-K clearly states that all operating expenses are not allocated among the Company's operating segments. Ultimately, Mr. Tregillis' calculations ignore Generally Accepted Accounting Principles, mischaracterize the level at which Apple collects and reports its financial performance, and contradict the clear testimony of Apple's CODM and finance professionals.⁴⁴⁴

11.3. Mr. Tregillis Ignores GAAP and Mischaracterizes the Level of Detail Apple Uses and Requires for Management Decision Making

246. In addition to Mr. Tregillis' incorrect identification of Products & Services category sales data as reporting segment data, he opines that “[i]n order to effectively evaluate business segment reporting, it is often important that the reporting includes ‘fully-burdened’ costs, to provide a complete picture of the financial performance of the business or business unit that is represented in a report such as a P&L.”⁴⁴⁵

247. Mr. Tregillis makes this claim to both confuse the reader and through that confusion, establish a meritless foundation for the flawed conclusion that detailed, fully-burdened financial information is or must be available for each of the Company's Products & Services categories and ultimately, for the App Store. However, his incorrect identification of the Products & Services categories of Apple as reporting segments and his failure to consider the fact that Apple reports segment information based on the Management Approach are significant flaws in his argument.

⁴⁴³ Expert Report of Christian Tregillis, June 1, 2021, ¶28.

⁴⁴⁴ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,875:21; Mark Rollins, Deposition, February 11, 2021, pp. 78:8-79:19.

⁴⁴⁵ Expert Report of Christian Tregillis, June 1, 2021, ¶28.

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248. Specifically, GAAP requires a company's financial disclosures to be consistent with management's reporting structure and the way that the CODM assesses operating performance and makes key operating decisions, and Mr. Tregillis takes no issue with Apple's financial reporting in this regard.⁴⁴⁶ He does not opine that the Company's segment reporting is inconsistent in any way with management's reporting structure and the way that the CODM, in fact, assesses operating performance and makes key decisions. Simply put, the Company's GAAP financials reflect the indisputable fact that Apple management not only views and manages the company as a combined ecosystem but also does not completely allocate expenses.

249. Even at the segment reporting level, Apple does not fully allocate expenses. Apple's 10-K clearly states that the company does not allocate research and development, corporate marketing expenses, certain share-based compensation expenses, income taxes, various nonrecurring charges, and other separately managed general and administrative costs.⁴⁴⁷ As Tim Cook states in his testimony, “[Apple doesn't] do P&L's at an earnings level for … anything in the company other than for the total company.”⁴⁴⁸ Indeed, the only fully-burdened P&L provided in the Company's 10-K for the fiscal year ending September 26, 2020 is the Consolidated Statement of Operations.⁴⁴⁹

250. The fact that Apple does not prepare detailed fully-burdened financial data at the segment level has significant consequences to the conclusions Mr. Tregillis urges. There is a significant difference between the Company's consolidated operating income and the total reported operating income for the Company's reporting segments, as shown in the following figure.⁴⁵⁰

⁴⁴⁶ Ernst & Young “Financial Reporting Developments, A Comprehensive Guide – Segment Reporting – ASC 280,” revised April 2020, p. 1.

⁴⁴⁷ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

⁴⁴⁸ Timothy Cook, Deposition, February 12, 2021, p. 163:1-6.

⁴⁴⁹ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 31.

⁴⁵⁰ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, pp. 31, 55-56, 59.

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Figure 19: Apple Consolidated vs. Segment Operating Income (\$ millions)⁴⁵¹

CONSOLIDATED STATEMENTS OF OPERATIONS			
	Years ended		
	September 26, 2020	September 28, 2019	September 29, 2018
Net sales:			
Products	\$ 220,747	\$ 213,883	\$ 225,847
Services	53,768	46,291	39,748
Total net sales	274,515	260,174	265,595
Cost of sales:			
Products	151,286	144,996	148,164
Services	18,273	16,786	15,592
Total cost of sales	169,559	161,782	163,756
Gross margin	104,956	98,392	101,839
Operating expenses:			
Research and development	18,752	16,217	14,236
Selling, general and administrative	19,916	18,245	16,705
Total operating expenses	38,668	34,462	30,941
Operating income	66,288	63,930	70,898
SEGMENT INFORMATION & GEOGRAPHIC DATA WITH TOTAL			
Americas:	2020	2019	2018
Net sales	\$ 124,556	\$ 116,914	\$ 112,093
Operating income	\$ 37,722	\$ 35,099	\$ 34,864
Europe:			
Net sales	\$ 68,640	\$ 60,288	\$ 62,420
Operating income	\$ 22,170	\$ 19,195	\$ 19,955
Greater China:			
Net sales	\$ 40,308	\$ 43,678	\$ 51,942
Operating income	\$ 15,261	\$ 16,232	\$ 19,742
Japan:			
Net sales	\$ 21,418	\$ 21,506	\$ 21,733
Operating income	\$ 9,279	\$ 9,369	\$ 9,500
Rest of Asia Pacific:			
Net sales	\$ 19,593	\$ 17,788	\$ 17,407
Operating income	\$ 6,808	\$ 6,055	\$ 6,181
Segment operating income	\$ 91,240	\$ 85,950	\$ 90,242

251. Apple does not allocate joint R&D and corporate expenses to and among the identified reporting segments because it does not view those expenses on an allocated basis in managing the business; and if joint costs are not and cannot be allocated at the segment level, those costs cannot

⁴⁵¹ Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, pp. 31, 55, 56.

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be meaningfully allocated at the category level of operations, or more specifically, to the App Store.⁴⁵²

252. Further, any exercise to allocate joint expenses such as R&D for management planning would not be meaningful. Each iOS product and service offered by Apple is a component of the iOS platform, a complete ecosystem that contributes to and relies upon all of Apple's infrastructure and intellectual property assets. The costs of developing and maintaining that ecosystem are joint, inseparable costs that cannot be allocated in an economically meaningful way.⁴⁵³ Moreover, the components of the ecosystem benefit from one another, and the IP and infrastructure assets resident in each business line support all other aspects of the ecosystem, including the App Store. Accordingly, any attempt to allocate joint costs to arrive at standalone profitability for an individual operating unit below the segment level would be an arbitrary exercise that ignores the contribution of joint costs to the rest of the ecosystem.

11.4. Plaintiffs' Experts' Reliance upon Internal Reports Does Not Demonstrate that Apple Prepares Fully-Burdened, Standalone Profitability for the Products & Services Categories of Apple

253. In their reports, Plaintiffs' experts Mr. Tregillis, Dr. Elhauge, and Dr. McFadden proffer opinions about the profitability of Apple's App Store Business. Because Apple does not publicly disclose fully-burdened profitability data below the consolidated enterprise, Plaintiffs' experts refer to internal Apple documents in an effort to estimate fully-burdened, standalone App Store profitability and margin information. They review and analyze some of the following documents, which I refer to collectively in this section as the ("Tregillis/Elhauge/McFadden Apple Documents"):⁴⁵⁴

⁴⁵² Apple Inc. SEC Form 10-K for the fiscal year ended September 26, 2020, p. 55.

⁴⁵³ Timothy Cook: "allocation of costs, of joint costs, are very difficult to do, and it's open for debate about how to do it. And so you would wind up getting the company focused on arguing between the different areas about where costs should be and it would be totally unproductive."

Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:25-3,876:4.

⁴⁵⁴ Mr. Tregillis relies upon the majority of these documents in this collection, excepting APL-APPSTORE_04685284; APL-APPSTORE_08856864; APL-EG_08926412; APL-APPSTORE_10332891. Both Dr. Elhauge and Dr. McFadden rely on selected documents. See Expert Report of Einer Elhauge, June 1, 2021, ¶202-04 (addressing APL-APPSTORE_10176241, APL-APPSTORE_08856866); Expert Report of Daniel McFadden, June 1, 2021, ¶40, 117-19 (addressing APL-APPSTORE_10176241), 120 (addressing APL-APPSTORE_10332891; APL-EG_08926412), 121 (addressing APL-APPSTORE_04685284, APL-APPSTORE_04685286), 122 (addressing APL-APPSTORE_08856864).

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- Products & Services Profitability Based on Aug'19 LRF Corporate FP&A September 2019⁴⁵⁵
- FY20 LRF – Dec'19 Corporate FP&A 12/18/19⁴⁵⁶
- Internal App Store presentations⁴⁵⁷
- Internal financial data (including those not identified as App Store statements)⁴⁵⁸
- Internal Apple emails⁴⁵⁹

11.4.1. Internal Reports Are Not Prepared in Accordance With GAAP

254. The Tregillis/Elhauge/McFadden Apple Documents are ad-hoc, internal use documents prepared for management consumption and include data characterized as revenue and “operating profit” for Products & Services and for the App Store (and, in some cases, iTunes, not the App Store).⁴⁶⁰ The Tregillis/Elhauge/McFadden Documents are not regularly prepared and reviewed by management. Moreover, in many cases, the focus of the documents used to support Plaintiffs’ experts’ operating margin conclusions is not profitability. For example, the 2019 and 2020 App Store business update presentations relied upon by Plaintiffs’ experts are not financial statement analyses.⁴⁶¹ These presentations focus instead on revenues, billings, new features, and services. Ranging from approximately 100 to 200-pages, these presentations include no more than two slides of limited, unannotated, year over year comparative P&L data.

255. GAAP accounting standards do not apply to these analyses, and they were not prepared in accordance with GAAP. The fact that the Tregillis/Elhauge/McFadden Apple Documents are not prepared in accordance with GAAP, and the fact that GAAP accounting standards do not generally apply to internal financial statements is important for the following reasons:

- Accounting methods for internal financial statements and presentations typically utilize “Managerial Accounting” and are not required to comply with any accounting standard. Managerial accounting is specifically meant to help managers make decisions as well as plan

⁴⁵⁵ APL-EG_08926412.

⁴⁵⁶ APL-EG_10015140.

⁴⁵⁷ APL-APPSTORE_10187823; APL-APPSTORE_08883133; APL-APPSTORE_10176241.

⁴⁵⁸ APL-APPSTORE_09814097; APL-APPSTORE_09814099; APL-APPSTORE_09814098; APL-APPSTORE_08856866; APL-APPSTORE_09806205; APL-APPSTORE_04685286.

⁴⁵⁹ APL-EG_08926407; APL-APPSTORE_04685284.

⁴⁶⁰ See, e.g., Expert Report of Daniel McFadden, June 1, 2021, ¶120-21 (addressing APL-EG_08926412).

⁴⁶¹ APL-APPSTORE_10187823; APL-APPSTORE_08883133; APL-APPSTORE_10176241.

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for future events, thus will present information such that its most conducive for decision making.⁴⁶²

- The presentation of information in internal reports do not have to follow any industry-wide guidelines. Each organization is free to structure its reports in the format that organizes its information in the best way for it ... there is unending flexibility in the types of reports and information gathered.⁴⁶³
- The disparities between GAAP-compliant financial statements and internal financial statements could include differences in accounting for revenue recognition and cost recognition, as well as differences in overall statement structure. Furthermore, different managerial decisions necessitate different presentations of information, and could lead to variances even between internal financial reports within the same company.⁴⁶⁴

256. Therefore, any assumption that the financial information in the Tregillis/Elhauge/McFadden Apple Documents represents an estimate of the standalone fully-burdened performance of the Products & Services categories of Apple or the App Store—including the particular costs for the App Store—is unfounded. Further, as discussed above, an exercise to allocate joint costs that simply cannot be allocated in an economically defensible way to an individual category or operating segment would be arbitrary and meaningless.

11.4.2. Products & Services Report is Not a Fully-Burdened Standalone P&L

257. Plaintiffs' experts cite to "App Store Products and Services" reports and P&L presentations in opining that Apple has determined gross and net margins and cost information for the App Store.⁴⁶⁵ The documents upon which they rely, however, follow no specified reporting standards.

⁴⁶² Principles of Accounting Volume 2 – Managerial Accounting, Patty Graybeal, Mitchell Franklin, Dixon Cooper, February 14, 2019, pp. 21-28,
<https://openstax.org/books/principles-managerial-accounting/pages/1-2-distinguish-between-financial-and-managerial-accounting#0>.

⁴⁶³ Principles of Accounting Volume 2 – Managerial Accounting, Patty Graybeal, Mitchell Franklin, Dixon Cooper, February 14, 2019, pp. 21-28,
<https://openstax.org/books/principles-managerial-accounting/pages/1-2-distinguish-between-financial-and-managerial-accounting#0>.

⁴⁶⁴ Ibid

⁴⁶⁵ Expert Report of Daniel McFadden, June 1, 2021, ¶117-19; Expert Report of Chrisitan Tregillis, June 1, 2021, ¶23-34.

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258. Despite the fact that Management has consistently stated that they do not do P&Ls below the consolidated enterprise level, Mr. Tregillis argues that the Products & Services and App Store margins reflected in the Product & Services report must be fully-burdened, and that all operating costs have been accurately allocated to each identified business category.⁴⁶⁶

259. According to Mr. Tregillis, the Tregillis/Elhauge/McFadden Apple Documents utilize an undefined allocation method and the sum of the category financial data tie to, or with his allocation of certain unallocated costs, tie to the consolidated revenue and operating profit of the Company.⁴⁶⁷

260. Whether the information in these reports tie to the consolidated operations of Apple, however, does not indicate that the expenses of the individual component businesses have been fully allocated or burdened in a manner that would reflect the performance of the App Store on a standalone basis.

261. As discussed above, Apple operates as a cross-functional, interrelated ecosystem of Products & Services.⁴⁶⁸ Apple does not estimate financial data for its operating segments or components on a standalone basis. For purposes of internal planning, however, it is my understanding that simplistic, high-level expense calculations have been used by Apple to assess year-over-year performance. Specifically, according to Mark Rollins, Apple has used both revenue and headcount-based allocation methods to perform certain high-level, period over period comparisons for management.⁴⁶⁹ However, Mr. Rollins has been clear that these calculations are not fully-burdened P&Ls.

262. While high-level calculations may offer some insight into periodic trends, the use of revenue and headcount to allocate joint expenses in a cross-functional ecosystem such as Apple's is arbitrary and unreliable given the inherent inseparable nature of the costs. Moreover, in an ecosystem such as Apple, each of these methods are arbitrary, flawed, and offer limited insight into the costs allocable to an individual operating component within a cross-functional system.

263. Headcount is the most specious basis for expense allocation. Headcount is a poor indicator of standalone expense in a cross-functional business with shared costs, as some entities will be able

⁴⁶⁶ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,875:21; Mark Rollins, Deposition, February 11, 2021, pp. 78:8-79:19; Expert Report of Christian Tregillis, June 1, 2021, ¶23-50.

⁴⁶⁷ Expert Report of Christian Tregillis, June 1, 2021, ¶23-46.

⁴⁶⁸ Mark Rollins, Deposition, February 11, 2021, pp. 78:8-79:19.

⁴⁶⁹ Mark Rollins, Deposition, February 11, 2021, p. 42:14-19.

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to generate significant sales and profits with few employees by leveraging existing IP and infrastructure, while other entities may require more employees yet enjoy fewer benefits from the company's shared infrastructure and IP.

264. Expense apportionment based on net sales is also flawed and may result in the disproportionate allocation of shared expenses. Sales volume alone cannot measure the contribution of shared infrastructure and IP. High revenue, low margin businesses may require and benefit little from investment in IP and infrastructure while lower revenue, higher margin components more fully enjoy the benefits.

265. Given the limitations of these allocation methods, and the general issues surrounding the allocation of joint costs within a cross-functional ecosystem, even tying total operating margin of operating components to enterprise-level performance would be meaningless, as the consistent application of **any** allocation method for expenses incurred outside of the operating categories would result in a consolidated total equal to that of the enterprise.

266. Further, the practice of using only simplistic allocation methods is consistent with Mr. Cook's testimony that allocation of joint operating expenses would "unproductive" because you would get the "company focused on arguing between different areas about where costs should be."⁴⁷⁰ Accordingly, Mr. Tregillis' conclusion that the App Store operating margins identified in the Tregillis/Elhauge/McFadden Apple Documents are fully-allocated / burdened and reflective of the profitability of the App Store on a standalone basis is flawed.

267. Unlike Mr. Tregillis, Dr. Elhauge and Dr. McFadden do not appear to even attempt to address the question of whether the documents upon which they rely are fully-burdened or otherwise represent accurate estimates of the costs associated with the App Store. Nor do they address the fact that Apple does not estimate or publicly disclose financial data for its operating segments or components on a standalone basis. By way of example, Dr. Elhauge chose not to rely upon the testimony of Apple witnesses about Apple's internal documents, instead explaining when asked if he knows how the figures in those documents were calculated: "I don't know the methodology that I [sic] used to calculate them. I'm relying here on their own description of what they are."⁴⁷¹ Dr. McFadden similarly does not address any Apple testimony explaining the methodology utilized for arriving at the numbers in these documents. Further, he qualified his

⁴⁷⁰ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,876:5.

⁴⁷¹ Einer Elhauge, Deposition, July 30, 2021, p. 308:13-15.

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testimony with “I’m not an accountant” when asked about the margin figures in his report.⁴⁷² For these reasons, even if the information were consistent with other Apple internal documents, there is still no basis to accept any of these experts’ margin calculations as the appropriate measure of the profitability of the App Store.

268. In addition, Dr. McFadden’s attempt to bolster his analysis with a comparison to “iTunes” data is flawed because of his reliance upon, again, Apple internal documents for which he does not address the methodology of calculation and because he provides no basis for why a comparison of the App Store to the iTunes Store would be appropriate. Separate and apart from his failure to consider the presentation itself, he presents no basis for believing that the App Store and the iTunes Store would utilize similar allocation approaches.

11.4.3. The Fact That Apple Uses Multiple Allocation Methods Provides Further Evidence That the Internal Analyses Are Not Fully-Burdened, Standalone Analyses

269. Each Product & Service offered by Apple is a part of a complete, interrelated ecosystem that contributes to and relies upon the whole of Apple’s infrastructure and intellectual property. Mr. Tregillis conceded during deposition that Apple considers the App Store as part of a broader ecosystem.⁴⁷³ The costs of developing and maintaining that ecosystem are joint and inseparable. Moreover, any attempt to isolate one category is arbitrary and ignores the impact on the remaining assets. Accordingly, an attempt to allocate joint costs to arrive at standalone profitability for an individual business line would be an unreliable, meaningless exercise.

270. The fact that multiple methods for the allocation of operating expenses exist simply confirms that while the calculated operating margins for the App Store included in the Tregillis/Elhauge/McFadden Apple Documents are useful for management planning, they cannot be relied upon as a representation of the fully-allocated / burdened standalone financials of the App Store.

271. Mr. Tregillis nevertheless argues that the simple fact that Apple appears to allocate most, or all, expenses proves that the operating margins for the App Store reflect a fully-burdened standalone business. Mr. Tregillis, however, ignores the implications of the fact that multiple methods of

⁴⁷² Daniel McFadden, Deposition, August 3, 2021, p. 103:24.

⁴⁷³ Christian Tregillis, Deposition, August 2, 2021, p. 148:4.

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allocation are used by Apple management to allocate expenses.⁴⁷⁴ The fact that Apple has multiple methods for the allocation of operating expenses indicates that management, in the ordinary course of business, prepares reports with different expense allocation methods and burdens for different purposes.

272. Further, Mr. Tregillis fails to consider the significance of inseparable joint costs throughout the iOS Products & Services category ecosystem. As discussed above, any exercise to allocate key joint expenses for management planning would not be meaningful. Likewise, both Dr. Elhauge and Dr. McFadden fail to consider the significance and impact on an operating margin calculation of inseparable joint costs and the manner in which Apple allocates expenses. Dr. Elhauge acknowledges, for example, that joint costs may exist, but testified that he assumes that the allocation of joint costs “[does not] affect[] the marginal cost measure.”⁴⁷⁵ He also testified that he assumes “for the alternative occurring fixed cost measure that it is proportionate to revenue.”⁴⁷⁶

273. In direct contradiction of the testimony of Apple’s CEO, taken under oath, Plaintiffs’ experts erroneously conclude that the operating margins included in the Tregillis/Elhauge/McFadden Apple Documents are fully-allocated / burdened standalone profitability indications. The Tregillis/Elhauge/McFadden Apple Documents were not prepared in accordance with GAAP, and the “margins” calculated therein are not fully allocated or burdened. Apple only calculates and reports fully-burdened operating margins at the enterprise level.⁴⁷⁷ Calculations of margin based on these documents therefore are based on calculations which are not GAAP, nor are they based on any codified accounting principles. As such, the calculations performed by Plaintiffs’ experts not only fail to provide a reliable estimate of the fully-burdened margins of the App Store, but also lack comparability to the GAAP margins reported by the purportedly comparable public companies identified in their reports.

11.5. The Plaintiffs’ Experts Have Not Identified Comparable Companies For Their Profit Margin Opinions

274. In his report, Mr. Tregillis asserts that other “marketplace companies have earned much lower operating margins than has Apple on the App Store.” He states that he was “asked to

⁴⁷⁴ Expert Report of Christian Tregillis, June 1, 2021, ¶38.

⁴⁷⁵ Einer Elhauge, Deposition, July 30, 2021, p. 310:12-13.

⁴⁷⁶ Einer Elhauge, Deposition, July 30, 2021, p. 310:12-13.

⁴⁷⁷ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,876:5.

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calculate operating margins for an identified set of companies.”⁴⁷⁸ At deposition, Mr. Tregillis confirmed that he does not present an opinion that the identified benchmark companies he uses are comparable to the App Store, or otherwise “attempt to undertake [his] own analysis of comparability or the differences.”⁴⁷⁹ Mr. Tregillis did note, however, that in assessing whether companies are comparable, “the idea is to find some that have enough similarity to make the comparison meaningful.”⁴⁸⁰ One would evaluate, typically, “things like industry... sometimes size...other factors.”⁴⁸¹

275. The basic premise of Mr. Tregillis’ conclusion – the one he was simply asked to calculate – is flawed. The operating margins of the identified companies are not comparable to the “operating margin” calculations for the App Store submitted by Mr. Tregillis. As discussed above, the “operating margin” calculations used and referenced by Mr. Tregillis do not offer a reasonable approximation of the standalone performance of the App Store. Moreover, it is impossible to measure the App Store’s profitability in isolation. The App Store is a part of the iOS platform and relies on all of Apple’s intellectual property. The costs associated with those assets are joint costs that simply cannot be allocated in an economically defensible way to individual business lines. Accordingly, any accounting measure of the App Store’s standalone profitability is arbitrary and unreliable as an indicator of profitability for the App Store. As Tim Cook testified, Apple does not calculate P&Ls by Products & Services because it views it as an unproductive exercise.⁴⁸²

276. Notwithstanding the fundamental flaw in Mr. Tregillis’ premise of comparability, he endeavors to compare what he claims to be the App Store’s profit margin to five companies (eBay, Inc., Etsy, Inc., Rakuten Group, Inc., MercadoLibre, Inc., and Alibaba Group Holdings, Limited) selected by another expert, Professor Nicholas Economides.⁴⁸³ Mr. Tregillis did not consider whether they sold the same types of goods or the same types of services as Apple, whether they

⁴⁷⁸ Expert Report of Christian Tregillis, June 1, 2021, ¶79.

⁴⁷⁹ Christian Tregillis, Deposition, August 2, 2021, p. 147:5-7.

⁴⁸⁰ Christian Tregillis, Deposition, August 2, 2021, p. 145:2-3.

⁴⁸¹ Christian Tregillis, Deposition, August 2, 2021, p. 145:10-17.

⁴⁸² Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,876:5.

⁴⁸³ Expert Report of Christian Tregillis, June 1, 2021, ¶81; Expert Report of Nicholas Economides, June 1, 2021, ¶43.

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facilitate app transactions, or otherwise engage in independent research or analysis.⁴⁸⁴ Mr. Tregillis also did not consider, for example, whether a cited marketplace licenses its IP to app developers or requires payments for transactions on its online marketplaces to be processed in any particular way.⁴⁸⁵ Mr. Tregillis also did not attempt to calculate an operating margin for other stores that facilitate app transactions, such as the Google Play Store, Sony PlayStation Store, Samsung Galaxy Store, Nintendo eShop, Microsoft Xbox, or Steam.⁴⁸⁶

277. The five companies addressed by Mr. Tregillis are not remotely comparable to the App Store. Unlike the App Store, the five companies identified by Mr. Tregillis are platforms for transactions of primarily physical goods, not digital transactions. These five companies also differ from the App Store along other dimensions, such as their overall patent portfolio size, whether the platforms are integrated into hardware provided by the company, whether they license technology and IP, the demographics of platform users, and the geographic markets in which they compete, among other differences. The fact that Apple has 46,675 active granted patents globally, compared to substantially smaller portfolios of the other companies, is indicative of the disparity in the level of innovation and technology investments these firms commit to their businesses.⁴⁸⁷ Accordingly, these purportedly comparable companies do not offer reliable benchmarks for the operations of the App Store. The table below summarizes the patent portfolio sizes of Apple and each of the five companies identified.

⁴⁸⁴ Christian Tregillis, Deposition, August 2, 2021, pp. 146:24-147:14 (“Q. So the companies that you list and identify here, you were given an identified set of companies, correct? A. That’s right. Q. You didn’t consider whether they sold the same types of goods as Apple, correct? A. I didn’t. I had some general awareness of similarities, but I did not attempt to undertake my own analysis of comparability or the differences. Q. You didn’t consider whether they – the types of services these companies provided, correct? A. You’re right. And again, I don’t need to keep restating it. I did not perform an analysis of comparability. I made an investigation based on a list that was provided to me.”); *see also* Christian Tregillis, Deposition, August 2, 2021, pp. 154:24-155:5 (“Q. From an eBay, Etsy, Rakuten Group, Inc., MercadoLibre, Inc. and the Alibaba Group Holdings, Limited, which of those companies does facilitate app transactions? A. I have not undertaken that analysis.... As I sit here, I can’t say for sure”).

⁴⁸⁵ Christian Tregillis, Deposition, August 2, 2021, p. 175:8-13.

⁴⁸⁶ Christian Tregillis, Deposition, August 2, 2021, p. 154:1-17.

⁴⁸⁷ Innography Patent Database, accessed August 2021.

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Figure 20: Global Patent Portfolios of Plaintiff-Proposed Marketplace Comparables⁴⁸⁸

Proposed Comparable	Active Granted Patents
Apple, Inc.	46,675
eBay, Inc.	2,477
Etsy	43
Rakuten	3,488
MercadoLibre	0
Alibaba	14,221

278. **eBay, Inc.** – eBay provides buyers and sellers access to a standalone online marketplace to transact physical products.⁴⁸⁹ eBay offers limited seller benefits such as payment processing, monitoring, a customer service team, and other simple marketplace features.⁴⁹⁰ Unlike Apple, the company is not part of a rich ecosystem of hardware and software IP and services; and unlike Apple, it does not provide the IP used to create, manage and improve the products bought and sold through the website. Additionally, eBay’s APIs and developer tools are limited to facilitating the integration of eBay website features and databases in third party applications and websites.⁴⁹¹ Accordingly, eBay does not offer a useful benchmark.

279. **Etsy, Inc.** – Like eBay, Etsy simply provides buyers and sellers access to a standalone online marketplace to transact primarily physical assets.⁴⁹² Further, like eBay, Etsy offers some basic seller benefits such as payments, promotions, and shipping.⁴⁹³ Etsy, unlike Apple, is not part of a rich

⁴⁸⁸ Innography Patent Database, accessed August 2021.

⁴⁸⁹ S&P Capital IQ Database, accessed July 2021.

⁴⁹⁰ “eBay is Managing Payments” *eBay*, <https://pages.ebay.com/seller-center/service-and-payments/managed-payments-on-ebay.html>.

⁴⁹¹ “eBay Developers Program,” *eBay*, <https://developer.ebay.com/products/license>

⁴⁹² S&P Capital IQ Database, accessed July 2021.

⁴⁹³ “Sell,” *Etsy*, <https://www.etsy.com/sell>.

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ecosystem of hardware and software IP and services; and unlike Apple, it does not provide the IP used to create, manage and improve the products bought and sold through the website. Additionally, Etsy's API is limited to facilitating the integration of Etsy website features into third-party applications and websites.⁴⁹⁴ Accordingly, Etsy does not offer a useful benchmark.

280. **Rakuten Group, Inc.** – Rakuten's Internet Services segment operates third-party e-commerce sites (principally in Japan), online cash-back sites, travel booking sites, golf reservation sites, and portal sites, along with a business for advertising delivered on these sites. Additionally, Rakuten's Internet Services segment includes businesses managing professional sports teams.⁴⁹⁵

281. While Rakuten's Internet Services segment provides buyers and sellers with access to eCommerce platforms, it is a marketplace for physical products, not a digital marketplace.⁴⁹⁶ It is not part of a rich ecosystem of hardware and software IP and services; and unlike Apple, it does not provide the IP used to create, manage, and improve the products bought and sold through its marketplace websites. Additionally, Rakuten's RapidAPI marketplace simply facilitates an API market between third-party API providers and developers.⁴⁹⁷ Rakuten's proprietary APIs are limited to facilitating the integration of marketplace functionality into third-party applications and websites.⁴⁹⁸ For these reasons, along with the fact that it operates multiple unrelated businesses (e.g., golf reservations, sports team management), Rakuten is not a useful benchmark.

282. **MercadoLibre, Inc.** – Mercado Libre is an online commerce platform in Latin America. The Mercado Libre platform provides users with services to facilitate commercial transactions for physical goods both digitally and offline. Mercado Libre offers users six e-commerce and digital payments services: the Mercado Libre Marketplace, the Mercado Pago FinTech platform, the Mercado Envios logistics service, the Mercado Libre Ads solution, the Mercado Libre Classifieds service, and the Mercado Shops online storefronts solutions.⁴⁹⁹ The company does not provide the rich ecosystem of hardware and software IP and services that Apple provides to its developers and consumers; and unlike Apple, it does not provide tools that directly improve the functionality and features of the products bought and sold on the website. Additionally, Mercado Libre's API is

⁴⁹⁴ “API Documentation,” *Etsy*, https://www.etsy.com/developers/documentation/getting_started/api_basics.

⁴⁹⁵ S&P Capital IQ Database, accessed July 2021.

⁴⁹⁶ S&P Capital IQ Database, accessed July 2021.

⁴⁹⁷ “What is Rakuten RapidAPI,” *Rakuten*, <https://api.rakuten.co.jp/docs/docs/what-is-rapidapi/>.

⁴⁹⁸ “What is Rakuten Webservice,” *Rakuten*, <https://webservice.rakuten.co.jp/>.

⁴⁹⁹ S&P Capital IQ Database, accessed July 2021.

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limited to facilitating the integration of marketplace functionality into third-party applications and websites.⁵⁰⁰ Accordingly, Mercado Libre does not offer a useful benchmark.

283. **Alibaba Group Holdings, Limited** – The core commerce segment of Alibaba is comprised of platforms operating in retail and wholesale commerce in China, cross-border and global retail and wholesale commerce, logistics services, local consumer services, and others.⁵⁰¹ Alibaba, however, does not provide the broad ecosystem of IP tools and services used by customers to create and consume the products sold on its website. Additionally, Alibaba’s APIs are limited to facilitating the integration of marketplace functionality into third-party applications and websites.⁵⁰² Accordingly, Alibaba’s core commerce segment is not a useful benchmark.

284. The five companies cited by Mr. Tregillis are not remotely comparable to the App Store. They are platforms for transactions in primarily physical goods, not digital transactions, and they are not part of an integrated platform of hardware and software IP. Further, any developer tools and APIs provided by these companies are limited only to integrating their marketplace functionality into other applications or websites, and, unlike Apple’s developer tools, do not relate to the creation of the goods or services being sold on their respective marketplaces.

285. Separate and apart from the question of whether the marketplace companies he studies constitute an appropriate benchmark, I also note that Mr. Tregillis did not conduct an adequate analysis to determine whether these companies’ financial information could provide a benchmark to Apple. For eBay, Etsy, and Mercado Libre, Mr. Tregillis testified that he relied upon their 10-Ks or other GAAP reports to determine product development line expense and general and administrative expense, for example.⁵⁰³ Mr. Tregillis did not disambiguate R&D that is used directly to support the eBay and Etsy marketplaces as opposed to other R&D, or seek to determine whether sellers on any of these platforms license proprietary platform IP.

286. With respect to Rakuten, which is not publicly traded in the U.S., Mr. Tregillis relies upon the company’s translated annual report prepared in accordance with International Financial Reporting Standards (“IFRS”), which he acknowledges differ from U.S. GAAP, and for which Mr.

⁵⁰⁰ “Desarrolla soluciones,” *MercadoLibre*, <https://developers.mercadolibre.com.mx/>.

⁵⁰¹ S&P Capital IQ Database, accessed July 2021.

⁵⁰² “Developer Library,” *Alibaba*, <https://open.alibaba.com/us/portal/resourceDetail?articleId=102685&categoryId=101737>.

⁵⁰³ Christian Tregillis, Deposition, August 2, 2021, pp. 159:4-162:25, 171:12-173:19.

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Tregillis stated that he limited his analysis to the “internet services segment.”⁵⁰⁴ Mr. Tregillis did not analyze or know whether Rakuten “uses its own marketplace for internet services as a complementary service to a device,” “takes a commission on sales” as part of the revenue in the internet services segment, or specifically accounts for R&D.⁵⁰⁵

287. For Alibaba, Mr. Tregillis relied upon its form 20-F financial disclosures.⁵⁰⁶ Mr. Tregillis did not evaluate how much Alibaba spends on R&D or whether it licenses its IP to app developers. Further, Mr. Tregillis did not disambiguate R&D that is used directly to support its online marketplace compared to other R&D.⁵⁰⁷

288. Given Mr. Tregillis’ failure to assess the comparability of either the operations or the financial information of the proposed market comparables, his analysis is insufficient to support the conclusion that those companies’ profitability is comparable to Apple’s App Store.

289. The “operating margin” calculations Mr. Tregillis calculates for the App Store do not offer a reasonable approximation of the standalone fully-burdened performance of the App Store. Because the App Store is a part of the iOS platform and relies on all of Apple’s intellectual property, it is impossible to measure App Store’s profitability in isolation. The costs associated with joint asset such as R&D are joint costs that simply cannot be allocated in an economically defensible way to individual operating segments. Accordingly, any accounting measure of the App Store’s standalone profitability is arbitrary and unreliable as an indicator of profitability for the App Store and thus unreliable for comparison to **any** third parties.

290. As Tim Cook has testified, Apple does not calculate P&Ls by Products & Services because it views it as an unproductive exercise.⁵⁰⁸ Accordingly, any purported calculation of the standalone profitability for the App Store is meaningless and the correct level for the comparison of Apple’s profitability is at the enterprise level.

⁵⁰⁴ Christian Tregillis, Deposition, August 2, 2021, pp. 163:2-12, 167:15-17.

⁵⁰⁵ Christian Tregillis, Deposition, August 2, 2021, pp. 163:25, 164:4-9, 170:18-19.

⁵⁰⁶ Christian Tregillis, Deposition, August 2, 2021, p. 174:3-4.

⁵⁰⁷ Christian Tregillis, Deposition, August 2, 2021, p. 173:19.

⁵⁰⁸ Trial Transcript, Testimony of Timothy Cook, May 21, 2021, Trial at 3,875:19-3,876:5.

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12. SIGNATURES

291. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on August 10, 2021.



James E. Malackowski

A handwritten signature in black ink, appearing to read "James E. Malackowski". It is written over a horizontal line.

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INTELLECTUAL CAPITAL EQUITY



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Appendix A

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OCEAN TOMO®
INTELLECTUAL CAPITAL EQUITY®

August 10, 2021

JAMES E. MALACKOWSKI CURRICULUM VITAE

James E. Malackowski is the Co-Founder and Chief Executive Officer of Ocean Tomo, LLC, the Intellectual Capital Merchant Banc™ firm providing industry leading financial products and services related to intellectual property including financial expert testimony, valuation, strategy consulting, patent analytics, investment management and transaction brokerage. Ocean Tomo assists clients – corporations, law firms, governments and institutional investors – in realizing Intellectual Capital Equity® value broadly defined. Subsidiaries of Ocean Tomo include Ocean Tomo Investments Group, LLC, a registered broker dealer, and Ocean Tomo International (HK) Ltd.

Mr. Malackowski is a founding and continuous member of the IP Hall of Fame Academy. He has been recognized annually since 2007 by leading industry publications as one of the ‘World’s Leading IP Strategists’. Significantly, Mr. Malackowski is listed among “50 Under 45” by *IP Law & Business*™, included in the *National Law Journal*’s inaugural list of 50 Intellectual Property Trailblazers & Pioneers; and, named as one of “The Most Influential People in IP” by *Managing Intellectual Property*™. Mr. Malackowski was named as 1 of 50 individuals, companies and institutions that framed the first 50 issues of *IAM Magazine* as well as 1 of 60 leading global Economics Expert Witnesses by the same publication in 2014. In 2011 Mr. Malackowski was selected by the World Economic Forum as one of less than twenty members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013 he was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration. In 2018, Mr. Malackowski joined the Standards Development Organization Board of the Licensing Executives Society (USA & Canada), Inc. governing voluntary consensus-based professional practices that are guided in their development by the American National Standards Institute’s (ANSI’s) Essential Requirements. LES standards are designed to encourage and teach consensus practices in many of the business process aspects of intellectual capital management.

On more than fifty occasions, Mr. Malackowski has served as an expert in U.S. Federal Court, U.S. Bankruptcy Court, State Court, Court of Chancery, the Ontario Superior Court of Justice and global arbitrations on questions relating to intellectual property economics including the subject of valuation, reasonable royalty, lost profits, price erosion, commercial success, corrective advertising, creditor allocations, Hatch Waxman Act market exclusivity, business significance of licensing terms including RAND obligations, venture financing including expected risk / return, and equities of a potential injunction. Mr. Malackowski’s experience extends to matters of general business valuation and commercial disputes, both domestic and foreign. Mr. Malackowski has publicly addressed policy issues affecting international trade and has provided expert opinions concerning antidumping and countervailing duties imposed by the U.S. Department of Commerce as well as testimony on domestic industry, bond and remedies before the International Trade Commission.

Mr. Malackowski has substantial experience as a Board Director for leading technology corporations and research organizations as well as companies with critical brand management issues. He is Past President of The Licensing Executives Society International, Inc. as well as its largest chapter, LES USA & Canada, Inc. Mr. Malackowski focuses his non-for-profit efforts with organizations leveraging science and innovation for the benefit of children, including those located in lesser developed countries. He has served since 2002 as a Trustee or Director of the National Inventors Hall of Fame, Inc., an organization providing summer enrichment programs for more than 100,000 students annually. For more than ten years Mr.



Malackowski served as a Director of Chicago's Stanley Manne Children's Research Institute, advancing the organization's agenda to measure and report the impact of its pediatric research.

Mr. Malackowski is a frequent speaker on emerging technology markets and related financial measures. He has addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CNBC World Wide Exchange, CBS News Radio and Fox Business National Television as well as other recognized news-based internet video channels. Mr. Malackowski is a current or past judge for the Illinois Technology Association's CityLIGHT™ Innovation Awards program, the University of Notre Dame McCloskey Venture Competition, 1st Source Faculty Commercialization Awards, and PBS's *Everyday Edisons*.

As an inventor, Mr. Malackowski has more than twenty issued U.S. patents. He is a frequent instructor for graduate studies on IP management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy. Mr. Malackowski is Certified/Accredited in Financial Forensics, Business Valuation and Blockchain Fundamentals. He is a Certified Licensing Professional and a Registered Certified Public Accountant in the State of Illinois. Mr. Malackowski has been certified to receive United States Sensitive Security Information (SSI) as governed by Title 49 Code of Federal Regulations.

EMPLOYMENT HISTORY

Co-Founder and Chief Executive Officer, *Ocean Tomo, LLC*, July 1, 2003 to present. Mr. Malackowski is responsible for all aspects of the firm's merchant banking practice. Mr. Malackowski was the Chairman and majority owner of Ocean Tomo, LLC until its sale to Bow River Capital in April of 2020.

President and Chief Executive Officer, *IP Equity Management, LLC*, doing business as Duff & Phelps Capital Partners, March 1, 2002 to June 30, 2003. The firm's intellectual property structured finance efforts were consolidated with Ocean Tomo on July 1, 2003.

Principal and Founder, *VIGIC Services, LLC*, July 1, 2000 to February 28, 2002. Mr. Malackowski identified and evaluated intellectual capital based private equity investment opportunities and served as an advisor to four completed transactions.

Principal and co-Founder, *IPC Group LLC*, August 1, 1988 – June 30, 2000. Mr. Malackowski also held the offices of President and CEO and was a Board member/ chairman of the firm. Along with four co-founders, Mr. Malackowski grew IPC Group to become the largest professional services firm specializing in intellectual property valuation and strategy consulting. IPC Group was sold in 1999 later changing its name to InteCap.

Executive Consultant, *Peterson & Co. Consulting*, Chicago, June 3, 1985 – July 30, 1988. Mr. Malackowski began with Peterson as a Staff Consultant and was the firm's quickest promotion to both Senior Consultant and Executive Consultant. Mr. Malackowski helped to establish the firm's intellectual property litigation and valuation practice. Peterson & Co. was sold to Saatchi & Saatchi PLC in 1988.



NON-PROFIT AND ASSOCIATION EXPERIENCE

Mr. Malackowski has been active in The Licensing Executives Society (LES) locally, nationally and internationally. LES is the premiere global professional association of technology transfer and intellectual asset management professionals with more than 9,000 members in more than 32 countries.

Mr. Malackowski is Past President of the Licensing Executives Society International, LLC, where his experience included the following positions:

- Director, LES Standards Development Organization (2018 – present)
- Chair, Past President's Council (2012 – 2013)
- President and Member of the Board (2011 - 2012)
- President Elect and Member of the Board (2010 - 2011)
- Secretary and Member of the Board (2007 - 2010)
- Member and Permanent Alternate, Board of Delegates (1992 - 2005)
- Past Chair, Membership, Investment, Education, Long-range Planning and Global Technology Impact Forum Committees.

Mr. Malackowski's term as President of LESI has been recognized for creation of the LESI Global Technology Impact Forum and concurrent Invent For Humanity™ Technology Transfer Exchange Fair; formalizing the National Presidents' Council; establishing the position of a permanent Executive Director; and, restructuring the leadership of LESI committees utilizing a Chair, Past Chair, Chair Elect ladder combined with functional responsibilities for committee Vice Chairs. This latter organizational stamp is based largely on Mr. Malackowski's experience as President of LES USA & Canada described below where he led a restructuring of the Board from a regional to a functional focus for each officer and Trustee. As with his tenure at his national Society discussed below, Mr. Malackowski led a financial turn-around returning LESI to positive cash flow following its' only two years of loss.

Mr. Malackowski is also Past President of The Licensing Executives Society (USA and Canada), Inc. where he held numerous offices in the organization including:

- President and Member of the Board (2001 – 2002)
- International Vice President and Member of the Board (2000)
- Treasurer and Member of the Board (1996 -- 1999)
- Trustee and Member of the Board (1992 – 1996)
- Chair, Annual Meeting in Miami Beach (1998) and the Summer Meeting in Chicago (1997)

Mr. Malackowski presided over a restructuring of the LES USA & Canada Board and a financial turn-around returning the organization to positive cash flow following its only two years of loss to such date. Mr. Malackowski is the youngest President to hold office at LES USA & Canada as well as at LES International.

In 2007, Mr. Malackowski was the Founding Chair of the Board of Governors for what is now Certified Licensing Professionals, Inc., administrator of the Certified Licensing Professional (CLP) program for professionals in the fields of



licensing, business development and commercialization of intellectual property. More than 1,000 individuals involved in patenting, marketing, valuation, IP law, negotiation, and intellectual asset management have earned the CLP certification. CLP, Inc. is a 501(c)(6) organization whose mission is to elevate the licensing profession through knowledge and standards.

In 2018 Mr. Malackowski joined the Standards Development Organization Board of LES USA & Canada. LES standards are voluntary consensus-based professional practices that are guided in their development by the "American National Standards Institute's (ANSI's) Essential Requirements." ANSI is the unique accrediting agency in the United States for voluntary consensus standards development organizations. LES is an accredited ANSI Standards Developer and as such guarantees its constituents that its standards will be developed in a fair, balanced, consensus-based, due process driven way. LES standards are designed to encourage and teach consensus practices in many of the business processes aspects of intellectual capital management and, where appropriate, offer enterprises the opportunity to differentiate themselves based on their use of these consensus professional practices, through certification of conformance to those standards.

Mr. Malackowski extends significant time to non-profit activities directed towards a further understanding of the economic importance of innovation and intellectual property, in both the United States and developing economies. These efforts include:

- Founding Board Member and member of the Executive Committee, United Stages Intellectual Property Alliance (USIPA), (2020 -)
- Judge, University of Notre Dame McCloskey Venture Competition (2019 -)
- Advisory Council, University of Chicago, Pritzker School of Molecular Engineering (2018 -)
- Judge, Illinois Technology Association, CityLIGHTS™ Innovation Awards (2013 -)
- Member, World Economic Forum Network of Global Agenda Councils (2011 - 2012)
- Director, International Intellectual Property Institute, Washington D.C., (2002 - 2007)
- Resident Advisor, U.S. Infomation Agency, (1999)
- Resident Advisor, U.S. Department of Commerce Commercial Law and Development Program (1997)
- Founder and Chairman, The Center for Applied Innovation, Inc. (2004 -)

In addition to his University instruction described herein, Mr. Malackowski focuses his non-for-profit efforts with those organizations leveraging science and innovation for the benefit of children.

- Director, Children's Research Fund (2013); Co-Chair Annual Fund Campaign (2013)
- Director, National Inventors Hall of Fame, Inc. (NIHF) including service as a Member, Trustee or Director of related subsidiaries and Board Committees (2001 - 2019). The NIHF provides summer enrichment programs for more than 160,000 students annually including [Camp](#)



Invention™ for kids in grades 1-6 (and their parents and teachers); Collegiate Inventors Competition™ for college students (and their mentors); and, Club Invention™ for kids in grades 1-6 (and their parents and teachers). NIHF provides more than 20,000 camp scholarships annually for children in financial need.

- President's Council, Chicago Museum of Science and Industry (2005 - 2011) including participation on the Education Advisory Committee (2007 - 2009) and the Alternative Revenue Committee (2008 - 2011)
- Director, Stanley Manne Children's Research Institute (2009 - 2020) including Chair of the Board's Technology Transfer Committee (2014 - 2020) and the Strategic Planning Resources Committee (2011 - 2012). Mr. Malackowski is recognized for initiating the development of a program to measure and track innovation metrics relevant to the Institute.

Mr. Malackowski was the Founder of the Center for Applied Innovation, a Chicago based non-for-profit with both local and international programs. CAI was created to manage education, public policy outreach and related economic activity around applied technology and intellectual property (IP) rights in the State of Illinois and around the world.

- CAI created and patented the first commoditized contract for technology licensing, the Unit License Right™. This innovation has been licensed to the Chicago-based Intellectual Property Exchange International.
- Under Mr. Malackowski's continued leadership as Chairman, CAI organizes the Invent for Humanity™ Technology Transfer Exchange Fair (InventforHumanity.org) launched in January, 2012, in Geneva, Switzerland. Invent for Humanity showcases field-ready, sustainable innovations, known as "appropriate technologies", leveraging the experience of licensing professionals to match and structure the actual transfer of such technology to meet recognized needs of emerging market economies.

Mr. Malackowski's association and non-profit activities are informed in part by his participation in the Harvard Business School Executive Education Program on Governing for Nonprofit Excellence, November 2000. Mr. Malackowski's Board service is informed by his participation at the Rock Center Corporate Governance Directors College for Venture-Backed Company Directors, Stanford University, March 2016.

RELATED OFFICES

Berg, LLC, Member, Council of Advisors, Senior Advisor, Intellectual Property Licensing & Innovation (2012 - 2015)

The Copyright Hub, LLC d/b/a 3Discovered, Founder. The company was formed as a collaborative venture between Ocean Tomo, LLC and Liberty Advisor Group in 2013. 3Discovered is a current portfolio company of US-based venture capital firm AITV. Mr. Malackowski served as Chairman of the company through September 2016. (2103 - 2106)

Curious Networks, Inc., Director, (1999 - 2000), Co-Chair of the Board's Strategic Partnership Committee. Mr. Malackowski led the company's first and



second round of venture funding.

ewireless, Inc. (f/k/a JEMAN Holdings, Inc. d/b/a Cellular Linking), Director, (1995-1999, 2000-2002)

Ford Global Technologies, Inc., Ford Motor Company, Director (1997-2001). Mr. Malackowski advised Ford Motor Company on the original business strategy which led to the formation of FGTI. FGTI was the largest known technology management company in the United States during Mr. Malackowski's term.

Infocast, Corporation (OTC BB: IFCC.OB), Director (2001-2002). Member of the Audit and Compensation Committees. Mr. Malackowski led the transition of the company's senior management team and continued U.S. based funding efforts.

Insignis, Inc., Director (2000-2002) Mr. Malackowski led the company's first round of venture funding. Insignis is a Chicago based provider of institutional financial data services.

The Intellectual Property Coin Group, Inc., Chairman and Co-Founder (2018 -). The company is a planned Ethereum based blockchain platform and related cryptocurrency designed to facilitate IP based transactions. See www.IPcoinGroup.com.

The Intellectual Property Exchange International, Inc. Mr. Malackowski was the founder of the company guiding initial product development of IPXI and recruitment of executive management. In 2011, IPXI was funded by an industry consortium including the Chicago Board Options Exchange. Mr. Malackowski was the Chair or Co-Chair of the Exchange from inception to February 26, 2015.

JEMAN Technologies, Inc., Founder. (1995 – 1999). Mr. Malackowski led the company's efforts to develop new technologies related to wireless direct response services. JEMAN was sold to ewireless, Inc. in 1999 as part of a venture transaction funded by Bedrock Capital Partners and Tredegar Investments.

Solutionary, Inc., Director (2000-2013). Arranged and advised on Solutionary's asset acquisition of S3 Networks effective August 31, 2001 and sale to strategic buyer in 2013. Member of the Board's Compensation Committee.

Sendle, Pty, Advisor (2012-2015). See www.Sendle.com.

EDUCATION AND CERTIFICATION

University of Notre Dame, B.B.A., Bachelor of Business Administration with majors in Accountancy and Philosophy. Graduated Summa Cum Laude, 1985.



Registered Certified Public Accountant, State of Illinois Certificate Number 41,187 issued January 16, 1986; License No. 239.007831; Expires September 30, 2021.

Certified Licensing Professional, Certificate Number 1606 issued July 1, 2008; Expires June 30, 2021.

Certified in Financial Forensics, CFF™, American Institute of Certified Public Accountants, Certificate Number 391 issued July 31, 2008; Expires July 31, 2021.

Accredited in Business Valuation, ABV™, American Institute of Certified Public Accountants, Certificate Number 4278 issued May 31, 2014; Expires July 31, 2021.

Accredited in Blockchain Fundamentals for Accounting and Finance Professionals, American Institute of Certified Public Accountants, Certificate Number 15860970 issued December 17, 2018; Expires December 31, 2020.

**UNIVERSITY
INSTRUCTION**

John Marshall Law School, Intellectual Property Damages (1992 - 1994)

DePaul University, Intellectual Property Entrepreneurial Finance (2003)

The George Washington University Law School, Intellectual Property Management (2004)

The University of Chicago Graduate School of Business:

- Intellectual Property Investment (2004 - 2006)
- Entrepreneurial Discovery, MBA Course 34705, Adjunct Professors Mark Tebbe and Brian Coe (Fall 2014 - 2015)

Indiana University Kelly School of Business, Intellectual Property Finance (2005)

University of Notre Dame, Mendoza College of Business, Adjunct Instructor:

- MBA Interterm Intensives, Intellectual Property Based Market Transactions, Valuation and Trading (Fall 2006, Fall 2008)
- MBA Executive Program, Course MBAE 70639, Intellectual Property, (Spring Semester 2008)
- MBA Program, Litigation Support and Valuation (Spring 2009)
- Notre Dame Law School, Advanced Trial Advocacy, LAW 75713-10 (Spring 2017)
- Member, Venture Builder Community Advisory Board (2019 -)

University of California at Berkeley Haas School of Business, Innovation Markets (2008)



Chicago-Kent College of Law, Adjunct Professor of Law, IP Financial Markets and Legal Principles (Fall 2008)

Rutgers Professional Science Master's Program, Fundamentals of Intellectual Property (Summer 2011)

Northwestern University Kellogg School of Management, Adjunct Instructor:

- MGMT 441, Intellectual Property Management, Clinical Professor James G. Conley (Fall 2012, Spring 2013 - 2017)
- DSGN 460, Innovation in Context, McCormick Engineering School (Spring 2017)

University of Texas McCombs School of Business, MBA Course: Open Innovation, Professor Sirkka Jarvenpaa (Spring 2013)

University of Arizona, James E. Rogers College of Law, Advisor, Intellectual Property & Entrepreneurship Clinic (2017 -)

- IP Valuation (Spring 2017)
- IP Valuation for Commercial Transactions (Spring 2019)

University of Southern California, Lloyd Greif Center for Entrepreneurial Studies at the Marshall School of Business, Entrepreneurs Guide to Intellectual Property, Professor Luke L. Dauchot, JFF 322 (Fall 2017)

MEMBERSHIPS

American Institute of Certified Public Accountants, Member 01182237 (1985 -)
The Economic Club of Chicago (1990 - 2019)
The Licensing Executives Society (1988 -)
Young Presidents' Organization ("YPO" / "YPO Gold" Chicago Chapter, 2006 - 2017) (Mid-America U.S. At Large Chapter, 2019 -)

RECOGNITION AND AWARDS

Individually, Mr. Malackowski has been recognized for his expertise as well as his work in developing markets for intellectual property transfer including:

- *EY Entrepreneur Of The Year®*, Regional Semifinalist (2019 and 2020)
- "IAM Global Leaders", *IAM Magazine* (2020)
- "IAM Patent 1000: The World's Leading Patent Professionals", *IAM Magazine* (2015-2019)
- Named to the *National Law Journal's* inaugural list of 50 Intellectual Property Trailblazers & Pioneers. (August 2014)
- Named as 1 of 60 leading global Economics Expert Witnesses in the *IAM Patent 1000*, *IAM Magazine*. Selection based on interviews by IAM researchers with more than 100 patent litigators. (May 2014)
- Inductee, Chicago Area Entrepreneurship Hall of Fame as selected by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration, (2013; 28th Year of Program)



- Named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011.
- “IP Personalities of 2008”, *IAM blog* by Joff Wild, Editor
- “IAM Strategy 300: The World’s Leading IP Strategists”, *IAM Magazine* (2012-2019); formally presented and included as “World’s 250 Leading IP Strategists”, *IAM Magazine* (2009-2011)
- “50 Under 45”, *IP Law & Business*™(2008)
- “The Most Influential People in IP”, *Managing Intellectual Property*™ (2007)
- Member, IP Hall of Fame Academy (2007-)

Ocean Tomo as a firm has been likewise recognized for its accomplishments including:

- Ocean Tomo was chosen as the exclusive U.S. representative for the 2016 Healthcare & Pharma Leading Expert Awards by *Global Health & Pharma Magazine*.
- Ocean Tomo was recognized as a member of the 2015 *Inc. 5000*® list of fastest-growing private companies in America.
- Ocean Tomo was honored in 2011 with the “Best of Chicago Award in Investment Advisory Services” by the U.S. Commerce Association (USCA).
- In addition to Mr. Małkowski, Ocean Tomo as a firm was named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011 and the only firm other than Microsoft (2 of 50 mentions) to be recognized multiple times (5 of 50 mentions).
- The firm’s Chicago office was presented the 2011 *Alfred P. Sloan Awards for Business Excellence in Workplace Flexibility* after having been finalist for scoring in the top 20% of all firm’s measured nationally.
- Ocean Tomo was recognized in 2010 by Corporate Voices for Working Families for its work-life balance as part of the National Workplace Flexibility Campaign published by *USA Today*.
- Ocean Tomo was recognized as a juried Finalist for the Illinois Technology Association 2010 CityLIGHTS Award for raising the stature of the Illinois technology industry.
- Selected as case study organization for Haas School of Business, University of California, Berkeley (2009)
- Selected as case study organization for Harvard Business School MBA Program (2008)
- Ocean Tomo was named one of 20 small and mid-sized firms recognized as the “Best Places to Work in Illinois” by Best Companies Group in a competition sponsored by the Illinois Chamber of Commerce and the Illinois State Council Society for Human Resource (2007)
- Ocean Tomo Auctions received the 2006 Chicago Innovation Award for most innovative new product or service introduced between January 1, 2005, and July 31, 2006, that uniquely satisfied unmet needs in the marketplace. The award was presented by Kuczmarkska & Associates and the *Chicago Sun-Times*.



- Ocean Tomo Auctions was awarded the Department of Commerce Technology Administration & National Knowledge & Intellectual Property Management 2006 Innovator of the Year Award.
- Ocean Tomo was recognized as a “Top Ten IP Newsmakers of 2006” by *IP Law & Business*, Almanac 2006.

Numerous authors and graduate business programs have written case studies about Ocean Tomo and its affiliates including:

- Piscione, Deborah Perry, The Risk Factor, Copyright 2014.
- Houle, David, Entering the Shift Age, Copyright 2013.
- Kuczynski, Thomas D., Dan Miller and Luke Tanen, Innovating Chicago-Style: How Local Innovators Are Building The National Economy, Copyright 2012.
- Houle, David, The Shift Age, Copyright 2007.
- Chesbrough, Henry, Open Business Models: How to Thrive in the New Innovation Landscape, Copyright 2006.
- Harvard Business School Case Study
- University of California Business School Case Study

RELATED U.S. SPEECHES AND PUBLICATIONS

“The Determination of a Reasonable Royalty: Hypothetical Negotiation v. A General License Agreement”, The Licensing Executives Society, Chicago Chapter, December 8, 1987.

“The Business Economics of Technology Development”, The Licensing Executives Society, New England Chapter, February 9, 1988.

“The Importance of Protecting Intellectual Property Through Corporate Transition”, Licensing Executives Society, National Meeting, October 18, 1989, Moderator.

“Valuation of Intellectual Property Rights”, The Chicago Bar Association, March 6, 1990.

“Dispute Resolution -- There Are Alternatives!”, Licensing Executives Society, National Meeting, October 22, 1990.

“How to Value a License”, Adding to the Bottomline Through Licensing, LES / John Marshall Law School, November 1, 1990.

“An Advanced Discussion on Licensing and Patent Damages”, Licensing Executives Society, National Meeting, October 28, 1992.

“An Advanced Discussion on Patent Damages”, Licensing Executives Society, National Meeting, October 18, 1993.

Royalty Provisions in Technology License Agreements, Technology Transfers, American Conference Institute, November 15 & 16, 1993.



“Commercializing Technology and the Intellectual Property Quality Management Imperative”, Technology Transfer, American Conference Institute, June 20 & 21, 1994.

“How to Accurately Value Software”, The Software Protection and Litigation Institute, July 28 & 29, 1994.

“IP Damages Advanced Case Studies”, Licensing Executives Society, National Meeting, October 19, 1994.

“Preparation and Presentation of Damages by Outside Consultants”, AIPLA Mid-Winter Meeting, February 1, 1995

“Damages Discovery - An Expert's Perspective”, Intellectual Property Law Association, New York, December 15, 1995.

“Pre-Litigation Damages Techniques: Patents and More”, The Intellectual Property Strategist, March, 1996.

“Corporate Exposures to Copyright, Patent, Trademark, and Trade Secret Claims”, Digital Bullets - Digital Shields: A Financial Perspective, American Conference Institute, New York, March 5, 1996.

“IP Management and Taxation - How companies are proactively managing IP assets to maximize shareholder value, including measuring contribution of IP protection to corporate value”, American Bar Association, Virginia, April 11, 1996.

“Effectively Select & Use Experts in Trademark & Copyright Cases”, AIPLA Spring Meeting, Boston, May 1, 1996.

“The Industry-University Interface: Mechanisms For Technology Transfer”, 1996 AUTM Central Region / Licensing Executives Society Chicago Chapter, Chicago, July 21, 1996.

“Valuing Health Care Technologies”, Licensing Executives Society Winter Meeting, South Carolina, March 13, 1997.

“Creative Marketing & Packaging - How to Differentiate Yourself in a Competitive Market”, CTIA Annual Meeting, Atlanta, February 23, 1998.

“Intellectual Property Valuation: The Latest Techniques from Boardroom and Courtroom”, Patent Law Association of South Florida Annual Meeting, Fort Lauderdale, October 22, 1998.

“The Aftermath of *Rite-Hite v. Kelly*”, 16th Judicial Conference of the U.S. Court of Appeals for the Federal Circuit, Washington D.C., April 6, 1999.

“Expert Admissibility After Daubert”, Wisconsin Academy of Trial Lawyers, Milwaukee, December 3, 1999.



“Intellectual Property Strategic Planning: a Corporate Perspective”, Research Directors Association of Chicago, Winter Meeting, January 10, 2000.

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Kinetic Concepts, Inc., KCI Licensing, Inc., KCI USA, Inc., KCI Medical Resources, Medical Holdings Limited, KCI Manufacturing and Wake Forest University Health Sciences v. Convatec, Inc., Boehringer Wound Systems, LLC and Boehringer Technologies, LP



Civil Action No. 1:08-CV-00918-WO-LPA
United States District Court for the Middle District of North Carolina
Deposition Testimony

Kruse Technology Partnership v. Caterpillar, Inc.
Case No. CV 04-10435
United States District Court for the Central District of California
Deposition Testimony

Kuryakan Holdings LLC v. Ciro, LLC et al
Civ. No. 3:15-CV-00703
United States District Court for the Western District of Wisconsin
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Leo Pharma A/S v. Tolmar, Inc. et al.
United States District Court for District of Delaware
C.A. No. 10-269 (SLR)
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Lincoln Electric Company, et al. v. National Standard, LLC
No. 1:09-cv-01886-DCN
United States District Court of Ohio Eastern Division
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LNP Engineering Plastics, Inc. and Kawasaki Chemical Holding Co., Inc. v.
Miller Waste Mills, Inc. trading as RTP Company
Civil Action No. 96-462 (RRM)
United States District Court for the District of Delaware
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Lotes Co. Ltd. v. Hon Hai Precision Industry Co. Ltd and Foxconn Electronics,
Inc.
Civil Action No. 3:11-cv-01036-WHA
United States District Court for the Northern District of California San
Francisco Division
Deposition Testimony

Lucent Technologies Inc. v. Extreme Networks, Inc.
Civil Action No. 03-508 (JJF)
United States District Court for the District of Delaware
Trial and Deposition Testimony

Lunar Corp. & The UAB Research Foundation v. EG&G Astrophysics Research
Corp.
Civil Action No. 96-C-199-S
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Match Group, LLC v. Bumble Trading Inc. et al.
Civil Action 6:18-cv-00080
United States District Court for the Western District of Texas Waco Division
Deposition Testimony



Matsushita Electric Industrial Co., Ltd. v. MediaTek, Inc., Oppo Digital., and Micro-Star International Computer Corp.
Case No. C05-03148 MMC
United States District Court for the Northern District of California San Francisco Division
Deposition Testimony

McKinley v. Zdeb
Civil Action No. 99-S-1178
United States District Court for the District of Colorado
Fact Deposition Testimony

Medgraph, Inc. v. Medtronic, Inc.
Case No. 6:09-cv-06610-DGL-MWP
United States District Court for the Western District of New York Rochester Division
Deposition Testimony

Medtronic Xomed, Inc. v. Gryus ENT LLC
Case No.: 3:04CV400-J-32 MCR
United States District Court for the Middle District of Florida Jacksonville Division
Deposition Testimony

MEI, Inc. v. JCM American Corp & Japan Cash Machine Co. Ltd.
United States District Court for the District of New Jersey
Civil Action No. 09-00351
Deposition Testimony

Message Phone, Inc. v. SVI Systems, Inc. and Tharaldson Properties
Civil Action No. 379CV-1813H
Trial Testimony

MGA Entertainment, Inc. and Isaac Larian v. Hartford Insurance Company of the Midwest, Harford Fire Insurance Company, The Hartford Financial Services Group and Does 1 through 10.
Case No. CV 08-0457 DOC (RNBx)
United States District Court for the Central District of California Southern Division
Deposition Testimony

Military Professional Services, Inc. v. BancOhio National Bank
Civil Action No. 91-5032
Deposition Testimony

Milwaukee Electric Tool Corporation, Metco Battery Technologies, LLC AC (Macao Commercial Offshore) Limited and Techtronic Industries Co. Ltd. v. Snap-On Incorporated
Case No. 2:14-cv-01296
United States District Court for the Eastern District of Wisconsin
Trial and Deposition Testimony



Minebea Co., Ltd., Precision Motors Deutsche Minebea GmbH, and Nippon Miniature Bearing Corp. v. George Papst, Papst Licensing GmbH, and Papst Licensing Verwaltungsgesellschaft MIT Beschränkter Haftung
Civil Action No. 97-CV-590 (PLF)
Trial and Deposition Testimony

Mitek Surgical Products, Inc. v. Arthrex, Inc.
Case No. 1:96CV0087S
United States District Court for the District of Utah, Central Division
Deposition Testimony

Mitsubishi Electric Corp., Koninklijke Philips N.V., Thomson Licensing, GE Technology Development, Inc. Panasonic Corporation and Sony Corporation v. Sceptre, Inc.
Case No. 2:14-cv-04994-ODW-AJW
United States District Court for the Central District of California
Deposition Testimony

Money Suite Company v. Insurance Answer Center, LLC; Answer Financial, Inc.; AllState Insurance Company; Esurance Insurance Services, Inc.
United States District Court Central District of California Southern Division
Deposition Testimony

Motorola, Inc. v. InterDigital Technology Corporation
Civil Action No. 93-488
United States District Court for the District of Delaware
Trial and Deposition Testimony

Motorola Solutions, Inc. and Motorola Solutions Malaysia SDN, BHD v. Hytera Communications Corporation Ltd., Hytera America, Inc. and Hytera Communications America (West), Inc.
Civil Action No. 1:17-cv-1973
United States District Court for the Northern District of Illinois Eastern Division
Trial and Deposition Testimony

Motorsport Aftermarket Group, Inc. v. Thomas Ellsworth
AAA Case No. 01-15-0006-1319
American Arbitration Association
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Nellcor Puritan Bennett, LLC v. CAS Medical Systems, Inc.
Case No. 2:11-CV-15697
United States District Court for the Eastern District of Michigan Southern Division
Deposition Testimony

Netlist, Inc. v. Diablo Technologies, Inc.
Civil Action No. 4:13-CV-05962-YGR
United States District Court for the Central District of California Oakland Division
Trial Testimony



Nomadix, Inc. v. Hewlett-Packard Company, et al.
Civil Action No. CV09-08441 DDP(VBKx)
United States District Court for the Central District of California Western
Division
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Nomix Corporation v. Quikrete Companies, Inc.
Civil Action No. H88-463-AHN
Trial and Deposition Testimony

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Civil Action No. N17C-05-619
Superior Court of the State of Delaware
Trial and Deposition Testimony

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Case No. 3:10-CV-03561-WHA
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Francisco Division
Deposition Testimony

Orthofix, Inc., et al v. EBI Medical Systems, Inc., et al.
Civil Action No. 95-6035 (SMO)
United States District Court for the District of New Jersey
Trial and Deposition Testimony

Pharmacia & Upjohn Company, LLC v. Sicor Inc. and Sicor Pharmaceuticals,
Inc.
Civil Action No. 04-833 (KAJ)
United States District Court for the District of Delaware
Deposition Testimony

Picker International, Inc. v. Mayo Foundation, et al.
Case No. 95-CV-2028
United States District Court for the Northern District of Ohio, Eastern Division
Trial and Deposition Testimony

Penda Corporation v. United States of America and Cadillac Products, Inc.
Case No. 473-89-C
United States Court of Federal Claims
Trial and Deposition Testimony

Peter Daou and James Boyce v. Arianna Huffington, Kenneth Lerer and
TheHuffingtonPost.com, Inc.
Index No. 651997/2010
Supreme Court of the State of New York, County of New York
Deposition Testimony

PlastiPak Packaging, Inc. v. Premium Waters Inc.
Case No. 3:20-cv-00098
United States District Court for the Western District of Wisconsin
Deposition Testimony



Plexxikon Inc. v. Novartis Pharmaceuticals Corporation
Case No. 4:17-cv-04405-HSG
United States District Court for the Northern District of California Oakland
Division
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Power Integrations, Inc. v. Fairchild Semiconductor International, Inc., Fairchild Semiconductor Corporation and System General Corporation
Case No. 3:09-cv-05235-MMC
United States District Court for the Northern District of California
Trial and Deposition Testimony

Powertech Technology, Inc. v. Tessera, Inc.
Case No. CV10-00945EMC
United States District Court for the Northern District of California
Deposition Testimony

Praxair, Inc. and Praxair Technology, Inc. v. ATMI, Inc. and Advanced Technology Materials, Inc.
Civil Action No. 03-1158-SLR
United States District Court District of Delaware
Deposition Testimony

Prism Technologies, LLC v. AT&T Mobility, LLC
Civil Action No. 8:12-cv-122-LES-TDT
United States District Court of Nebraska
Deposition Testimony

Prism Technologies, LLC v. T-Mobile USA, Inc.
Civil Action No. 8:12-cv-00124
United States District Court of Nebraska
Trial and Deposition Testimony

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Civil Action No. 8:12-cv-123-LES-TDT
United States District Court of Nebraska
Trial and Deposition Testimony

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Civil Action No. 94-16-LON
United States District Court for the District of Delaware
Trial and Deposition Testimony

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Civil Action No 03-6284 JFW (FMOx)
United States District Court for the Central District of California
Deposition Testimony

Qualcomm, Inc. v. InterDigital Communications Corporation
Case No. 93-1091G (LSP)
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Civil Action No. 02 CV 1157 (GEL)
United States District Court for the Southern District of New York
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Radware, LTD, and Radware, Inc. v. F5 Networks, Inc.
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United States District Court for the Southern District of California San Jose
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Remcor v. Scotsman/Booth
Civil Action No. 93 C 1822
United States District Court for the Northern District of Illinois, Eastern
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Remcor v. Servend
Civil Action No. 93 C 1823
United States District Court for the Northern District of Illinois, Eastern
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Rensselaer Polytechnic Institute and Dynamic Advances, LLC v. Apple Inc.
Case No 1:13-cv-00633 (DNH/DEP)
United States District Court for the Northern District of New York
Deposition Testimony

Research Corporation Technologies, Inc. v. Hewlett-Packard Company
Civil Action No. CIV 95-490-TUC-JMR
United States District Court for the District of Arizona
Deposition Testimony

Robert E. Morley, Jr. and REM Holdings 3, LLC v. Square, Inc., Jack Dorsey
and James McKelvey, Jr.
No. 4:14-cv-00172-CDP
United States District Court for the Eastern District of Missouri
Deposition Testimony

Rommy Hunt Revson v. The Limited, Inc. et al.
Civil Action No. 90-3840 (MGC)
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Ameren Corporation; Union
Electric Company; Central Illinois Public Service Company; Cilcorp, Inc.;
Central Illinois Light Company
Case No. 07-4955 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony



Ronald A. Katz Technology Licensing, LP v. AOL, LLC, CompuServe Interactive Services and Netscape Communications Corporation
CV 07-2134 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Cablevision Systems Corporation et. al.
Case No. 2:07-ML-01816 / 02314 RGK-FFM
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Charter Communications, Inc.; Charter Communications Holding Company, LLC; Charter Communications Operating, LLC; and Charter Communications Entertainment I, LLC
CV 07-2134 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. CIGNA Corporation, CIGNA HealthCorporation, CIGNA HealthCare of Delaware, Inc., Tel-Drug of Pennsylvania, LLC and Tel-Drug, Inc.
CV 07-2192 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Comcast Corporation, Sirius-XM Radio, Inc., et al.
NO. 2:07-ML-01816-CRGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. DHL Holdings (USA) Inc., DHL Express (USA), Inc., and Sky Courier, Inc.
Case No. 07-ml-01816-B RGK (FFMx)
United States District Court for the Central District of California
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Ronald A. Katz Technology Licensing, LP v. Fifth Third Bankcorp, Fifth Third Bank, Fifth Third Bank (Central Ohio)
Case No. 07-4960 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

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CV 07-2134 RGK (FFMx)
United States District Court for the Central District of California
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. United States Cellular Corporation, TDS Telecommunications Corporation and TDS Metrocom, LLC



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Deposition Testimony

RWM Kinetic Enterprises, Inc. and Thomas J. Ring v. Kinetic Concepts, Inc.
and KCI Therapeutic Services, Inc.
Case No. SA-96-CA-603-OG
United States District Court for the Western District of Texas San Antonio
Division
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Inc. and City of Hope
Case No. 2:15-CV-05685
United States District Court for the Central District of California Western
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Sanyo Electric Co., Ltd. v. Intel Corporation
Civil Action No. 2018-0723-MTZ
Court of Chancery of the State of Delaware
Deposition Testimony

Saxon Innovations, LLC v. Nokia Corp, et al. (including Samsung Electronics,
Co. and related parties)
Civil Action No. 6:07-cv-490-LED-JDL
United States District Court for the Eastern District of Texas Tyler Division
Deposition Testimony

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Case No. 1:11-cv-00268-EGB
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Deposition and Trial Testimony

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United States District Court for the Western District of Texas Marshall Division
Deposition Testimony

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Civil Action No. 1:15-cv-3702
United States District Court for the Northern District of Illinois Eastern Division
Trial and Deposition Testimony

Silicon Image, Inc. v. Analogix Semiconductor, Inc.
Case No. C 07-00635 JCS
United States District Court for the Northern District of California, San Francisco Division
Deposition Testimony

Site Microsurgical Systems v. The Cooper Companies
Civil Action S92-766
Deposition Testimony

Slot Speaker Technologies, Inc. v. Apple Inc.
Case No. 4:13-cv-01161-HSG
United States District Court Northern District of California Oakland Division
Deposition Testimony

SmartPhone Technologies, LLC v. Research In Motion Corp. et. al (on behalf of LG Electronics, Inc. and LG Electronics USA, Inc.)
Civil Action No. 6:10cv74-LED
United States District Court Eastern District of Texas Tyler Division
Deposition Testimony

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Civil Action No. 03-241 JJF
United States District Court for the District of Delaware
Trial and Deposition Testimony

Steven E. Berkheimer v. Hewlett-Packard Company
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United States District Court for the Northern District of Illinois Eastern Division
Deposition Testimony

STMicroelectronics, Inc. v. SanDisk Corp.
C.A. No. 4:05CV44
United States District Court of Texas Sherman Division
Deposition Testimony

STMicroelectronics, Inc. v. SanDisk Corp.
C.A. No. 4:05CV45
United States District Court of Texas Sherman Division
Deposition Testimony



Sunoco Partners Marketing & Terminals L.P. v. U.S. Venture, Inc., U.S. Oil, and Technics, Inc.
Civil Action No. 1:15-CV-8178
United States District Court for the Northern District of Illinois Eastern Division
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Deposition Testimony

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Deposition Testimony

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Civil Action No. 3:94-CV-2284-X
Deposition Testimony

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Alnylam Pharmaceuticals, Inc. and AlCana Technologies, Inc.
Civil Action No. 11-1010-BLS2
Massachusetts Superior Court for Suffolk County
Deposition Testimony

Tessera, Inc. v. Advanced Micro Devices, Inc. et al.
Case No. 4:05-cv-04063-CW
United States District Court for Northern District of California Oakland Division
Deposition Testimony

Tessera, Inc. v. UTAC (Taiwan) Corporation
Case No.: 5:10-cv-04435-EJD
United States District Court for Northern District of California San Jose
Division
Deposition Testimony

Therma-Tru Corporation v. Caradon Peachtree, Inc.
Civil Action No. 95-CV-75534-DT
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Deposition Testimony

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CaptionCall, LLC
Case No.: 3:14-cv-66-BBC
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Trial and Deposition Testimony



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United States District Court for the Northern District of California San Francisco Division
Deposition Testimony

Valmet Paper Machinery, Inc. and Valmet-Charlotte, Inc. v. Beloit Corporation
Civil Action No. 93-C-587-C

United States District Court for the Western District of Wisconsin
Trial and Deposition Testimony

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Deposition Testimony

Verinata Health, Inc. v. Ariosa Diagnostics, Inc.

Case No. 3:12-cv-055501-SI

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Viacom International Inc. v. MGA Entertainment, Inc.

Case No.: 2:15-cv-09621-R (Ex)

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VimpelCom Ltd. v. Orascom TMT Investments S.a.r.l.

London Court of International Arbitration

Arbitration No: 153077

Hearing Testimony

Volterra Semiconductor Corporation v. Primarion, Inc., Infineon Technologies AG and Infineon Technologies North America Corporation

Case No. C 08-05129 CRB

United States District Court for the Northern District of California San Francisco Division
Deposition Testimony

Wang Laboratories, Inc. v. America Online, Inc. and Netscape Communications Corporation

Civil Action No. 97-1628-A

United States District Court for the Eastern District of Virginia
Deposition Testimony

Wang Laboratories, Inc. v. FileNet Corporation

Civil Action No. 94-12141-RCL

Deposition Testimony

Waukesha Cherry-Burrell v. Wrightech Corporation

Civil Action No. 96-CV-00384



Deposition Testimony

Waymo LLC v. Uber Technologies, Inc., Ottomotto LLC and Otto Trucking LLC
Case No. 3:17-cv-00939-WHA
United States District Court for the Northern District of California San Francisco Division
Deposition Testimony

Whirlpool Corporation v. Drinker Biddle & Reath LLP et. al.
Case No. 2015-L-007631
Circuit Court of Cook County, Illinois
Trial and Deposition Testimony

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Case No. 9:13-CV-80567
United States District Court for the Central District of California
Deposition Testimony

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No. 5:06CV246-DF
United States District Court for the Eastern District of Texas
Texarkana Division
Deposition Testimony

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Appendix B

HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY
SUBJECT TO PROTECTIVE ORDER

Apple Inc. v Developers/Consumers

INFORMATION CONSIDERED

Appendix B

Produced Documents

APL-APPSTORE_00000055-APL-APPSTORE_00000087
APL-APPSTORE_04685284-APL-APPSTORE_04685285
APL-APPSTORE_04685286
APL-APPSTORE_08856864
APL-APPSTORE_08856866
APL-APPSTORE_08883133-APL-APPSTORE_08883332
APL-APPSTORE_09806205
APL-APPSTORE_09814097
APL-APPSTORE_09814098
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APL-APPSTORE_10137258-APL-APPSTORE_10137263
APL-APPSTORE_10176241-APL-APPSTORE_10176337
APL-APPSTORE_10187823-APL-APPSTORE_10187995
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APL-APPSTORE_10334884-APL-APPSTORE_10334960
APL-EG_08926407-APL-EG_08926408
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APL-EG_10015140-APL-EG_10015251
VALVE000675-VALVE000676

Apple Inc. v Developers/Consumers

INFORMATION CONSIDERED

Appendix B

Declarations and Expert Reports

Declaration of Philip W. Schiller In Support of Defendant Apple Inc.'s Opposition to Plaintiff's Motion for a Preliminary Injunction and Exhibits, September 15, 2020.
Expert Report of Christian Tregillis, June 1, 2021.
Expert Report of Daniel McFadden, June 1, 2021.
Expert Report of Dr. Nicholas Economides, June 1, 2021.
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Christian Tregillis, Deposition, August 2, 2021.
Daniel McFadden, Deposition, August 3, 2021.
Donald R. Cameron, Deposition, June 25, 2021.
Eddy Cue, Deposition, February 8, 2021.
Einer Elhauge, Deposition, July 30, 2021.
Mark Rollins, Deposition, February 11, 2021.
Nicholas Economides, Deposition, August 4, 2021.
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Timothy Cook, Deposition, February 12, 2021.

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Developer Plaintiffs' Motion for Class Certification, June 1, 2021.
Plaintiffs' Notice of Motion and Motion for Class Certification; Memorandum of Points and Authorities, June 1, 2021.
Stipulated Amended Protective Order, January 21, 2021.

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Epic Games, Inc.'s Notice of Motion and Motion for Temporary Restraining Order and Order to Show Cause Why a Preliminary Injunction Should Not Issue and Memorandum of Points and Authorities in Support Thereof, August 17, 2020.
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Trial Transcript, No. C-20-5640 YGR, Bench Trial.
Unreal Engine End User License Agreement, *Epic Games Inc. v. Apple, Inc.* trial exhibit DX-4022.

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Appendix C

HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY
SUBJECT TO PROTECTIVE ORDER

*Apple Inc. v Developers/Consumers***APPLE U.S. PATENTS AND APPLICATIONS**

Schedule 1.0

	Active and Granted			Applications			Total		
	Utility [1]	Design [2]	Total	Utility [3]	Design [4]	Total	Utility	Design	Total
U.S. Patents and Applications	24,091	3,157	27,248	3,784	-	3,784	27,875	3,157	31,032
Net Reissues [5]	5	-	5	-	-	-	5	-	5
Total	24,096	3,157	27,253	3,784	-	3,784	27,880	3,157	31,037

Notes and Sources:

[1] Schedule 1.1

[2] Schedule 1.3

[3] Schedule 1.2

[4] No U.S. Design patent applications were outstanding; Innography Patent Database, accessed on 7/9/2021.

[5] Schedule 1.4

*Apple Inc. v Developers/Consumers***APPLE U.S. ACTIVE GRANTED UTILITY PATENTS [1]**

Schedule 1.1

<u>Year of Patent Grant</u>	<u>U.S.</u>
2002	5
2003	46
2004	108
2005	141
2006	186
2007	210
2008	262
2009	453
2010	707
2011	822
2012	1,254
2013	1,860
2014	2,097
2015	2,052
2016	2,306
2017	2,495
2018	2,388
2019	2,676
2020	2,708
2021 (Partial)	1,315
Total	<u>24,091</u>

Notes and Sources:

[1] Innography Patent Database, accessed on 7/9/2021

*Apple Inc. v Developers/Consumers***APPLE U.S. ACTIVE UTILITY PATENT APPLICATIONS [1]**

Schedule 1.2

<u>Year Application Filed</u>	<u>U.S.</u>
2006	1
2007	4
2008	3
2009	-
2010	-
2011	3
2012	3
2013	19
2014	41
2015	54
2016	115
2017	205
2018	515
2019	1,075
2020	1,586
2021 (Partial)	<u>160</u>
Total	<u>3,784</u>

Notes and Sources:

[1] Innography Patent Database, accessed on 7/9/2021

*Apple Inc. v Developers/Consumers***APPLE U.S. ACTIVE GRANTED DESIGN PATENTS [1]**

Schedule 1.3

<u>Year of Patent Grant</u>	<u>U.S.</u>
2007	17
2008	66
2009	104
2010	155
2011	131
2012	154
2013	180
2014	200
2015	193
2016	434
2017	343
2018	291
2019	315
2020	356
2021 (Partial)	218
Total	<u>3,157</u>

Notes and Sources:

[1] Innography Patent Database, accessed on 7/9/2021

*Apple Inc. v Developers/Consumers***APPLE U.S. ACTIVE REISSUE PATENTS**

Schedule 1.4

Publication Number [1]	Kind Code	Assignee	Original Patent	Original Patent Type	Original Patent Included in Stated Total?	Source
USRE43780	E	Apple Inc.	US 6,776,660 B1	Utility	No	[2]
USRE43796	E	Apple Inc.	US 6,776,660 B1	Utility	No	[3]
USRE42038	E	Apple Inc.	US 7,420,546 B2	Utility	No	[4]
USRE45050	E	Apple Inc.	US 7,589,536 B2	Utility	Yes	[5]
USRE47529	E1	Apple Inc.	US 7,618,499 B2	Utility	No	[6]
USRE45793	E	Apple Inc.	US 7,698,297 B2	Utility	Yes	[7]
USRE47934	E1	Apple Inc.	US 7,698,297 B2	Utility	Yes	[9]
USRE45492	E	Apple Inc.	US 7,863,906 B2	Utility	Yes	[8]
USRE45634	E	Apple Inc.	US 7,940,119 B2	Utility	Yes	[10]
USRE46758	E1	Apple Inc.	US 7,941,758 B2	Utility	Yes	[11]
USRE45652	E	Apple Inc.	US 7,952,429 B2	Utility	Yes	[12]
USRE46346	E1	Apple Inc.	US 8,145,984 B2	Utility	Yes	[13]
USRE46139	E1	Apple Inc.	US 8,289,283 B2	Utility	Yes	[14]
USRE46139	E	Apple Inc.	US 8,289,283 B2	Utility	Yes	[14]
USRE47592	E1	Apple Inc.	US 8,438,498 B2	Utility	Yes	[15]
USRE46864	E1	Apple Inc.	US 8,610,671 B2	Utility	Yes	[16]
USRE46818	E1	Apple Inc.	US 8,656,309 B2	Utility	Yes	[17]
USRE47915	E1	Apple Inc.	US D652,823 S	Design	Yes	[18]
USRE47664	E1	Apple Inc.	US D741,316 S	Design	Yes	[19]
USRE48580	E1	Apple Inc.	US D741,316 S	Design	Yes	[20]
USRE48581	E1	Apple Inc.	US D741,316 S	Design	Yes	[21]
USRE48582	E1	Apple Inc.	US D741,316 S	Design	Yes	[22]
Total Net Reissue Patents Not in Stated Total [23]					5	

Apple Inc. v Developers/Consumers

APPLE U.S. ACTIVE REISSUE PATENTS

Schedule 1.4

Notes and Sources:

- [1] Innography Patent Database, accessed on 2/9/2021
- [2] Patent No. USRE43780; Patent No. US 6,776,660 B1.
- [3] Patent No. USRE43796; Patent No. US 6,776,660 B1.
- [4] Patent No. USRE42038; Patent No. US 7,420,546 B2.
- [5] Patent No. USRE45050; Patent No. US 7,589,536 B2.
- [6] Patent No. USRE47529; Patent No. US 7,618,499 B2.
- [7] Patent No. USRE47934; Patent No. US 7,698,297 B2.
- [8] Patent No. USRE45793; Patent No. US 7,698,297 B2.
- [9] Patent No. USRE45492; Patent No. US 7,863,906 B2.
- [10] Patent No. USRE45634; Patent No. US 7,940,119 B2.
- [11] Patent No. USRE46758; Patent No. US 7,941,758 B2.
- [12] Patent No. USRE45652; Patent No. US 7,952,429 B2.
- [13] Patent No. USRE46346; Patent No. US 8,145,984 B2.
- [14] Patent No. USRE46139; Patent No. US 8,289,283 B2. USRE46139 E1 and USRE46139 E are two separate entries on Innography, but appear to be the same patent.
- [15] Patent No. USRE47592; Patent No. US 8,438,498 B2.
- [16] Patent No. USRE46864; Patent No. US 8,610,671 B2.
- [17] Patent No. USRE46818; Patent No. US 8,656,309 B2.
- [18] Patent No. USRE47915; Patent No. US D652,823 S.
- [19] Patent No. USRE47664; Patent No. US D741,316 S.
- [20] Patent No. USRE48580; Patent No. US D741,316 S.
- [21] Patent No. USRE48581; Patent No. US D741,316 S.
- [22] Patent No. USRE48582; Patent No. US D741,316 S.
- [23] Calculated as sum of “No” plus 1 from U.S. Patent No. 7,698,297 having two reissues

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APPLE REGISTERED U.S. COPYRIGHTS

Schedule 2.0

U.S. Copyrights [1]

Total Apple Registered Copyrights [2]	5,023
Apple Registered Copyrights with “iOS” [3]	232
Apple Registered Copyrights with “iOS” in Title [4]	212

Notes and Sources:

[1] U.S. Copyright Office Database, accessed on 7/15/2021

[2] Search Term: Name: “Apple Inc.”

[3] Search Term: Name: All (KNAM) “Apple Inc.” as a phrase AND Keyword “iOS” as a phrase

[4] Search Term: Name: All (KNAM) “Apple Inc.” as a phrase AND Title (TKEY) “iOS” as a phrase

*Apple Inc. v Developers/Consumers***APPLE LIVE REGISTERED ACTIVE U.S. TRADEMARKS**

Schedule 2.1

<u>Trademark Count [1]</u>	
Total Apple Live Registered Trademarks [2]	1,037
App Store [3]	1
CloudKit [4]	2
CoreML [5]	-
iAd [6]	2
Metal [7]	1
Metal Logo [7]	1
Multi-Touch [8]	-
Quartz [9]	1
Safari [10]	1
Apple Swift [11]	1
Swift [11]	1
Swift Playgrounds [11]	1
SwiftUI [11]	1
There's an app for that [12]	2

Notes and Sources:

- [1] U.S. Patent and Trademark Office Trademark Electronic Search System, accessed on 8/2/21.
- [2] Owner Name and Address: "Apple Inc" AND Owner Name and Address: "Apple Park Way."
- [3] Owner Name and Address: "Apple Inc" AND All: "App Store."
- [4] Owner Name and Address: "Apple Inc" AND All: "CloudKit."
- [5] Owner Name and Address: "Apple Inc" AND All: "Core ML."
- [6] Owner Name and Address: "Apple Inc" AND All: "iAd."
- [7] Owner Name and Address: "Apple Inc" AND All: "Metal."
- [8] Owner Name and Address: "Apple Inc" AND All: "Multi-Touch."
- [9] Owner Name and Address: "Apple Inc" AND All: "Quartz."
- [10] Owner Name and Address: "Apple Inc" AND All: "Safari."
- [11] Owner Name and Address: "Apple Inc" AND All: "Swift."
- [12] Owner Name and Address: "Apple Inc" AND All: "There's an app for that."

*Apple Inc. v Developers/Consumers***APPLE APP STORE APPLICATION CATEGORIES [1]**

Schedule 3.0

Category	Description
Books	Apps that provide extensive interactivity for content that is traditionally offered in printed form.
Business	Apps that assist with running a business or provide a means to collaborate, edit, or share content.
Developer Tools	Apps that provide tools for app development, management, and distribution.
Education	Apps that provide an interactive learning experience on a specific skill or subject.
Entertainment	Apps that are interactive and designed to entertain and inform the user, and which contain audio, visual, or other content.
Finance	Apps that perform financial transactions or assist the user with business or personal financial matters.
Food & Drink	Apps that provide recommendations, instruction, or critique related to the preparation, consumption, or review of food or beverages.
Games	Apps that provide single or multiplayer interactive activities for entertainment purposes.
Graphics & Design	Apps that provide tools for art, design, and graphics creation.
Health & Fitness	Apps related to healthy living, including stress management, fitness, and recreational activities.
Lifestyle	Apps relating to a general-interest subject matter or service.
Kids (iOS and iPadOS only)	Apps designed specifically for children ages 11 and under.
Magazines & Newspapers	Apps that offer auto-renewing subscriptions to magazine or newspaper content.
Medical	Apps that are focused on medical education, information management, or health reference for patients or healthcare professionals.
Music	Apps that are for discovering, listening to, recording, performing, or composing music, and that are interactive in nature.
Navigation	Apps that provide information to help a user travel to a physical location.
News	Apps that provide information about current events or developments in areas of interest such as politics, entertainment, business, science, technology, and so on.
Photo & Video	Apps that assist in capturing, editing, managing, storing, or sharing photos and videos.
Productivity	Apps that make a specific process or task more organized or efficient.
Reference	Apps that assist the user in accessing or retrieving information.
Safari Extensions (macOS only)	Apps that offer extensions to help enhance and customize the web browsing experience on Safari.
Shopping	Apps that support the purchase of consumer goods or materially enhance the shopping experience.
Social Networking	Apps that connect people by means of text, voice, photo, or video. Apps that contribute to community development.
Sports	Apps related to professional, amateur, collegiate, or recreational sporting activities.
Travel	Apps that assist the user with any aspect of travel, such as planning, purchasing, or tracking.
Utilities	Apps that enable the user to solve a problem or complete a specific task.
Weather	Apps that provide forecasts, alerts, and information related to weather conditions.

Notes:[1] "Choosing a Category," Apple Developer, <https://developer.apple.com/app-store/categories/>.

*Apple Inc. v Developers/Consumers***EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS**

Schedule 3.1

	Definitions & Usage	Notes and Sources
APIs that permit the app to interact with the iOS device's UI and critical security elements		
Architecture	<p>Architecture allows developers to access machine-level and architectural information about the current platform. It is part of the Kernel framework.</p> <p>"Cocoa is the best application framework out there, but it's based on a mouse and keyboard input, so we took everything we knew about creating a great object-oriented, user interface application framework with Cocoa and everything we knew about creating a touch API for the iPhone and we combined them and we built Cocoa Touch, and this is our user interface application framework for the iPhone OS." In fact, this here is the architecture of the iPhone OS."</p>	<p>"Architecture," <i>Apple</i>, https://developer.apple.com/documentation/kernel/architecture</p> <p>APL-APPSTORE_00000055-87 at '62</p>
CoreFoundation	<p>CoreFoundation is a framework that provides fundamental software services useful to application services, application environments, and to applications themselves. It allows developers to access low-level functions, primitive data types, and various collection types with the Foundation Framework.</p> <p>"Dive deep with us to see how to use fundamental Core Foundation and C types in your Swift code."</p> <p>"The Foundation framework provides the 'nuts and bolts' classes for both iPhone OS and Mac OS programming, and an understanding of the Foundation framework is essential for building great software on the Mac, iPhone, and iPad."</p>	<p>"Core Foundation," <i>Apple</i>, https://developer.apple.com/documentation/corefoundation/</p> <p>"Swift Interoperability In Depth", <i>Apple WWDC 2014</i>, https://asciiwwdc.com/2014/sessions/407?q=core%20foundation</p> <p>"Understanding Foundation", <i>Apple WWDC 2010</i>, https://asciiwwdc.com/2010/sessions/124?q=core%20foundation</p>
Face ID	<p>Face ID is an authentication tool used to access an iOS device as well as additional features, purchasing content, or synchronizing data on the device. Face ID is an instance property, which means it is an object that cannot be reused.</p> <p>"With a simple glance, Face ID securely unlocks your iPhone or iPad Pro....Developers can also allow you to use Face ID to sign into their apps. Apps that support Touch ID automatically support Face ID."</p> <p>"Machine learning allows us to create Face ID which provides fast secure authentication for your iOS devices. And we use machine learning in ways that you may not expect, subtle ways that improve your experience with your devices."</p>	<p>"FaceID," <i>Apple</i>, https://developer.apple.com/documentation/avfoundation/avmetadatafaceobject/1386945-faceid; "Authentication," <i>Apple</i>, https://developer.apple.com/design/human-interface-guidelines/ios/user-interaction/authentication/</p> <p>"About Face ID advanced technology", <i>Apple</i>, https://support.apple.com/en-us/HT208108</p> <p>"Designing Great ML Experiences", <i>Apple WWDC 2019</i>, https://asciiwwdc.com/2019/sessions/803?q=face%20id</p>

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	<u>Definitions & Usage</u>	<u>Notes and Sources</u>
Push Notification	<p>Apple Push Notification Services (APN) is a secure and efficient service for app developers to propagate information to iOS, watchOS, tvOS, and macOS devices. With push notification setup, developers can send notification requests to APNs and APNs will deliver notification payloads to each targeted device.</p> <p>"You know, since iOS 3 and OS X Lion, you've been able to integrate push notifications into your native apps. And boy, do users love them. Apple has sent over 7.4 trillion push notifications to users. So, clearly, users love getting push notifications on their devices."</p> <p>"Gain insights from real-time server logs into events across all of your users—including CloudKit push notifications—to facilitate debugging and customer support."</p>	<p>"APNs Overview," <i>Apple</i>, https://developer.apple.com/library/archive/documentation/NetworkingInternet/Congnceptual/RemoteNotificationsPG/APNSOverview.html</p> <p>"Implementing OS X Push Notifications for Websites", <i>Apple WWDC 2013</i>, https://asciwwdc.com/2013/sessions/614?q=push%20notification</p> <p>"Build Better Apps with CloudKit Dashboard", <i>Apple WWDC 2017</i>, https://asciwwdc.com/2017/sessions/226?q=push%20notification</p>
Security	<p>Security provides a framework for protecting information, establishing trust and controlling access to software.</p> <p>"Apple devices, platforms, and services provide world-class security and privacy to our users, with powerful APIs for you to leverage in your own apps."</p> <p>"Secure the data your app manages, and control access to your app....Use the Security framework to protect information, establish trust, and control access to software. Broadly, security services support these goals:</p> <ul style="list-style-type: none"> -Establish a user's identity (authentication) and then selectively grant access to resources (authorization). -Secure data both on disk and in motion across a network connection. -Ensure the validity of code to be executed for a particular purpose." <p>"We have an amazing number of apps that use Touch ID API to save their users from having to remember complex passwords and type them directly into the app, and last year, we introduced a feature called App Transport Security that provides strong protection to app information as it travels across the network to that app's servers."</p>	<p>"Security," <i>Apple</i>, https://developer.apple.com/documentation/security</p> <p>"Security," <i>Apple</i>, https://developer.apple.com/security/</p> <p>"How iOS Security Really Works", <i>Apple WWDC 2016</i>, https://asciwwdc.com/2016/sessions/705?q=security</p>

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	<u>Definitions & Usage</u>	<u>Notes and Sources</u>
TouchID	<p>TouchID is part of the local authentication framework which allows users to rely on biometric authentication to enable secure, effortless access to their devices. The framework includes topics such as first steps in logging a user into the app with Touch ID, authentication and access, errors, and other references.</p> <p>"We have an amazing number of apps that use Touch ID API to save their users from having to remember complex passwords and type them directly into the app, and last year, we introduced a feature called App Transport Security that provides strong protection to app information as it travels across the network to that app's servers."</p>	<p>"Local Authentication," <i>Apple</i>, https://developer.apple.com/documentation/localauthentication/</p> <p>"Logging a User into Your App with Face ID or Touch ID," <i>Apple</i>, https://developer.apple.com/documentation/localauthentication/logging_a_user_into_your_app_with_face_id_or_touch_id</p> <p>"How iOS Security Really Works", <i>Apple WWDC 2016</i>, https://asciwwdc.com/2016/sessions/705?q=security</p>
UIKit	<p>UIKit provides infrastructure for iOS or tvOS apps. Like Foundation, UIKit defines classes, protocols, functions, data types and constants. It defines the core components of an iOS application, from labels and buttons to table views and navigation controllers. Features offered include: window and view architecture, event handling infrastructure (i.e., Multi-Touch), animation support, document support, drawing and printing support, information about the current device, text management and display, search support, accessibility support, app extension support and resource management, and provides the main run loop to manage interactions among the user, the system and app.</p> <p>"Number one, UIKit is great for user interface, and particularly as you've seen in the demo, for games."</p> <p>"But one of the real benefits about using UIKit was it gives the game the same user interface as every other application on that player's phone."</p> <p>"Number one, UIKit is great for user interface, and particularly as you've seen in the demo, for games. It's extremely flexible, versatile, and it's great."</p> <p>Q. So what is UI kit? A. It is Apple's APIs for putting graphical elements such as buttons lists pictures into an application. Q. And UI is user interface? A. That's correct. Q. So it's a fairly basic[] kit. And by 'basic,' I mean fundamental. Like your say, buttons and all for the user to literally interact with the device, correct? A. Yes."</p>	<p>"UIKit," <i>Apple</i>, https://developer.apple.com/documentation/uikit</p> <p>"iOS From Scratch With Swift: First Steps With UIKit," Bart Jacobs, <i>envato-tuts+</i>, December 16, 2015, https://code.tutsplus.com/tutorials/ios-from-scratch-with-swift-first-steps-with-uikit--cms-25461</p> <p>"Game Design and Development for iPhone OS, Part 1", <i>Apple WWDC 2010</i>, https://asciwwdc.com/2010/sessions/401?q=uikit</p> <p>Trial Transcript, Testimony of Andrew Grant, May 5, 2021 Trial at 745:6-15</p>
UserNotifications	<p>UserNotifications is used to push user-facing notifications to the user's device from a server, or generate them locally from the app.</p> <p>"User notifications in iOS X have a beautiful new design."</p>	<p>"User Notification," <i>Apple</i>, https://developer.apple.com/documentation/usernotifications/</p> <p>"Advanced Notifications", <i>Apple WWDC 2016</i>, https://asciwwdc.com/2016/sessions/708?q=user%20notification</p>

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	Definitions & Usage	Notes and Sources
Xcode	<p>Xcode consists of a suite of tools that developers use to build, test, and submit apps for Apple platforms.</p> <p>"Provides developers the software features that are necessary to design, develop, and debug software for use on iOS and macOS."</p> <p>"Xcode enables you to create great apps for Apple platforms."</p> <p>"So Xcode is a development platform for creating apps for iOS, watchOS, tvOS, and OS X, macOS. It gives you the tools to create a complete app, from designing your user interface and implementing code, to testing and debugging your application, to provisioning your app for distribution on the App Store."</p> <p>"Q. If you know, what developer tools did you use to build your app? A. Well, we used Xcode and the - the new programming language that Apple came out - came out with around that time."</p>	<p>"Xcode," <i>Apple</i>, https://developer.apple.com/documentation/xcode/</p> <p>"Introduction to Xcode", <i>Apple WWDC 2016</i>, https://asciiwwdc.com/2016/sessions/413?q=xcode</p> <p>Donald R. Cameron, Deposition, June 25, 2021, p. 185:16-21</p>
Authentication	<p>Authentication Services framework is used to improve the experience of users when they enter credentials to establish their identity. The framework gives users the ability to sign into services with their Apple ID, enables users to look up stored passwords, provide password less registration and authentication workflow for apps and websites using iCloud Keychain, perform automatic security password upgrades, share data between an app and web browser using OAuth to leverage existing web-based logins in the app, and create single-sign-on experiences.</p> <p>"Secure sign-in and authentication is a key feature of a secure account-based app design. Learn how you can improve your app's login experiences through an overview of the available authentication services and details on specific technologies such as Sign In with Apple ID, Password AutoFill for iPad Apps for Mac, advances in OAuth and WebAuthentication, and a new API for streamlined password sign-in."</p> <p>"And that's how easy it is to use the new Authentication services APIs to make the process of getting signed into your apps even more streamlined than password AutoFill was able to."</p>	<p>"Authentication Services," <i>Apple</i>, https://developer.apple.com/documentation/authenticationservices</p> <p>"What's New in Authentication", <i>Apple WWDC 2019</i>, https://asciiwwdc.com/2019/sessions/516?q=authentication%20services</p>

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	Definitions & Usage	Notes and Sources
Authorize/Authorization	<p>Authorization Services is a programming interface to the Security Server and its policy database which facilitates access control to restricted areas of the operating system and apps.</p> <p>"With that, let's get started talking about Core Locations, major features. The first one is the authorization API. Now, you should know that the authorization API is required in order to access the user's location."</p> <p>"Okay, for authorization, we highly recommend you use when-in-use authorization whenever possible. Users like knowing that you can't track them without their knowledge."</p>	<p>"Authorization Services," <i>Apple</i>, https://developer.apple.com/documentation/security/authorization_services</p> <p>"Core Location Best Practices", <i>Apple WWDC 2016</i>, https://asciiwwdc.com/2016/sessions/716?q=authorization%20service</p>
Parental Controls	<p>Parental Controls can be activated on a device that is part of a Family Sharing group and signed into a child's iCloud account. To authorize parental controls, the AuthorizationCenter instance must be used.</p> <p>"The parental controls that have been in OS X forever and the restrictions on iOS will really help parents configure the device to work the way they want it to work with their kids and as app developers you're kind of accustomed to this."</p>	<p>"FamilyControls," <i>Apple</i>, https://developer.apple.com/documentation/familycontrols</p> <p>"Kids and Apps", <i>Apple WWDC 2014</i>, https://asciiwwdc.com/2014/sessions/717?q=parental%20control</p>
APIs that Permit Interaction with Device Hardware		
CoreMotion	<p>CoreMotion is a framework that reports motion and environment related data from the onboard hardware of iOS devices, including accelerometers and gyroscopes, pedometers, magnetometer, and barometers. The framework gives developers and apps access to hardware-generated data.</p> <p>"Now, iOS already has great APIs for collecting passive data information, like HealthKit and CoreMotion."</p>	<p>"CoreMotion," <i>Apple</i>, https://developer.apple.com/documentation/coremotion</p> <p>"Building Apps with ResearchKit", <i>Apple WWDC 2015</i>, https://asciiwwdc.com/2015/sessions/213?q=coremotion</p>
Haptics Engine	<p>"We have an accelerometer and device motion recorder and a pedometer recorder that collect data from CoreMotion and we have a health quality type recorder for pulling data CHHapticEngine is a class within the Core Haptics framework. To play custom haptics, a haptic engine must be created which is used to establish the connection between your app and the underlying device hardware.</p> <p>"Core Haptics lets you design your own haptics with synchronized audio on iPhone."</p> <p>"It's called Core Haptics. This new API allows you developers to use the tactile engine fully in iPhone. The tactile engine is capable of rendering a wide range of experiences and can generate a custom vibration like this, it looks like this, and it should sound and feel like this [beeping sound]."</p>	<p>"CHHapticEngine," <i>Apple</i>, https://developer.apple.com/documentation/corehaptics/chhapticengine</p> <p>"Expanding the Sensory Experience with Core Haptics", <i>Apple WWDC 2019</i>, https://asciiwwdc.com/2019/sessions/223?q=haptics</p>

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	Definitions & Usage	Notes and Sources
Connectivity APIs		
CloudKit	CloudKit is a framework that provides interfaces for moving data between an app and its iCloud containers. CloudKit is used to store an app's existing data in the cloud so that the user can access it on multiple devices.	CloudKit, <i>Apple</i> , https://developer.apple.com/documentation/cloudkit
WebKit	WebKit is used to integrate web content seamlessly into an app, customize content interactions, display rich web content using HTML, CSS, and JavaScript, handle the incremental loading of page content, display multiple MIME types and compound frame elements, navigate between pages of content and manage a forward-back list of recently visited pages.	"Designing apps using CloudKit", <i>Apple</i> , https://developer.apple.com/icloud/cloudkit/designing/
Hypervisor	Hypervisor is a framework for developers to interact with virtualization technologies in user space, without third-party kernel extensions. This framework is used to create and control hardware-facilitated virtual machines and virtual processors.	"WebKit," <i>Apple</i> , https://developer.apple.com/documentation/webkit
Virtual Machines	A virtual machine object emulates a complete hardware machine of the same architecture as the underlying Mac computer. The virtual machine manages resources that the guest operating system uses, providing access to some hardware resources but emulating others.	"Hypervisor," <i>Apple</i> , https://developer.apple.com/documentation/hypervisor
Network Extension	Network Extension framework is used to customize and extend the core networking features of iOS and macOS. This is used to: change the system's Wi-Fi configuration, integrate your app with the hotspot network subsystem, create and manage VPN configurations using built-in or custom VPN protocols, implement an on-device content filter, and create and manage system-wide DNS configurations, using the build-in or custom DNS protocol/proxy.	"Virtual Machine," <i>Apple</i> , https://developer.apple.com/documentation/virtualization/vzvirtualmachine
SharePlay	SharePlay gives users the ability to share experiences by integrating apps into FaceTime. Group Activities API and AV Foundation APIs are integrated to allow immersive features such as smart volume and shared playback controls.	"Network Extension," <i>Apple</i> , https://developer.apple.com/documentation/networkextension
		"SharePlay," <i>Apple</i> , https://developer.apple.com/shareplay/

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APIs that Provide Monetization Options	Definitions & Usage	Notes and Sources
Apple Pay	<p>Apple Pay is part of the PassKit framework which includes topics for Apple Pay setup, Apple Pay Availability, Apple Pay Buttons, Payment Requests, Payment Sheet Interactions and Authorization, Payment Sheet Updates, QR Transaction Information, Entitlements for Apple Pay support, Errors, and billing/shipping information.</p> <p>"Over 900K apps have secure payment technologies like Apple Pay and StoreKit for goods and services."</p>	<p>"Apple Pay," <i>Apple</i>, https://developer.apple.com/documentation/passkit/apple_pay/</p> <p>"App Store", <i>Apple</i>, https://www.apple.com/app-store/</p>
iAd	<p>iAd is a framework used to attribute app downloads that originate from Apple Search Ads campaigns on iOS devices.</p>	<p>"iAd," <i>Apple</i>, https://developer.apple.com/documentation/iad</p>
IAP or In-App Purchase	<p>IAP is a feature that allows customers extra contents and features, including premium content, digital goods and subscriptions, directly within the app.</p>	<p>"In-App Purchase," <i>Apple</i>, https://developer.apple.com/in-app-purchase</p>
PassKit	<p>PassKit is a framework that allows developers to add Apple Pay to their app and manage passes in user's Wallet App.</p>	<p>"PassKit," <i>Apple</i>, https://developer.apple.com/documentation/passkit</p>
StoreKit	<p>StoreKit supports In-App Purchases, interactions with the App Store, such as Apple Music, and providing recommendations for third-party content and enabling users to rate and review apps.</p> <p>"Over 900K apps have secure payment technologies like Apple Pay and StoreKit for goods</p>	<p>"StoreKit," <i>Apple</i>, https://developer.apple.com/documentation/storekit</p> <p>"App Store", <i>Apple</i>, https://www.apple.com/app-store/</p>

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	Definitions & Usage	Notes and Sources
Graphics/Multi-Media APIs		
AudioToolbox	AudioToolbox provides interfaces for recording, playback and stream parsing. It is used to record or play audio, convert formats, parse audio streams and configure your audio session.	“Audio Toolbox,” <i>Apple</i> , https://developer.apple.com/documentation/audiotoolbox
AVFoundation	AVFoundation provides a framework for capturing, processing, synthesizing, controlling, importing, and exporting audiovisual media on Apple platforms by working with audiovisual assets, controlling device cameras, processing audio and configuring system audio interactions.	“AVFoundation,” <i>Apple</i> , https://developer.apple.com/documentation/avfoundation
CoreAudio	CoreAudio is a digital audio infrastructure that includes a set of software frameworks to handle audio needs. CoreAudio capabilities include recording, playback, sound effects, positioning, format conversion and file stream parsing.	“Core Audio Overview - Introduction,” <i>Apple</i> , https://developer.apple.com/library/archive/documentation/MusicAudio/Conceptual/CoreAudioOverview/Introduction/Introduction.html ; “What is Core Audio?,” <i>Apple</i> , https://developer.apple.com/library/archive/documentation/MusicAudio/Conceptual/CoreAudioOverview/WhatisCoreAudio/WhatisCoreAudio.html .
CoreGraphics	CoreGraphics provides a framework, based on the Quartz advanced drawing engine, for low-level, lightweight 2D rendering with output fidelity. This framework can be used to handle path-based drawing, transformations, color management, offscreen rendering, patterns, gradients and shadings, image data management, image creation, and image masking, as well as PDF document creation, display and parsing.	“Core Graphics,” <i>Apple</i> , https://developer.apple.com/documentation/coregraphics
CoreMedia	CoreMedia defines the media pipeline used by AVFoundation and other high-level media frameworks found on Apple platform. It is used to process media samples and manage queues of media data.	“Core Media,” <i>Apple</i> , https://developer.apple.com/documentation/coremedia
CoreVideo	CoreVideo enables processing of digital video—including manipulation of individual frames—using a pipeline-based API and support for both Metal and OpenGL.	“Core Video,” <i>Apple</i> , https://developer.apple.com/documentation/corevideo
Metal	Metal provides a framework that directly communicates with the graphics processors (“GPU”) to render advanced 3D graphics and perform data-parallel computations and, ultimately, maximize graphics and computing potential of OS.	“Metal Overview,” <i>Apple</i> , https://developer.apple.com/metal/ “Metal Documentation,” <i>Apple</i> , https://developer.apple.com/documentation/metal
QuartzCore	<p>“There are thousands of objects being rendered here in a scene that we couldn’t have dreamed building prior to Metal delivering a ten-fold increase in rendering efficiency. To have this level of graphics capability available on iPhone and iPad now is a stunning breakthrough.”</p> <p>QuartzCore is used to produce animated user interfaces by providing high frame rates and smooth animations without burdening the CPU and slowing down your app.</p>	<p>WWDC14 iOS 8 Metal Demo by EPIC Games (June 3, 2014), https://www.youtube.com/watch?v=NRoGwuSDh3E at 2:19</p> <p>“QuartzCore,” <i>glossarytech</i>, https://glossarytech.com/terms/ios/quartzcore; “Core Animation,” <i>Apple</i>, https://developer.apple.com/documentation/quartzcore</p>

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	Definitions & Usage	Notes and Sources
Gaming APIs		
GameController	GameController is used to discover and support game controllers connected to a device and receive input data.	"Game Controller," <i>Apple</i> , https://developer.apple.com/documentation/gamecontroller
GameKit	GameKit is used to implement Game Center social-gaming network features. Game Center is an Apple service that provides a single account that identifies players across all their games and devices. It enables players to interact with friends, compare leaderboard ranks, earn achievements and participate in multiplayer games.	"GameKit," <i>Apple</i> , https://developer.apple.com/documentation/gamekit
ReplayKit	ReplayKit is a framework that allows users to record video from the screen and audio from the app and microphone. Users can share their recordings with other users through email, messages, and social media.	"ReplayKit," <i>Apple</i> , https://developer.apple.com/documentation/replaykit
SpriteKit	SpriteKit is a general-purpose framework for drawing shapes, particles, text, images, and video in two dimensions. It uses the Metal framework to achieve high-performance rendering, while offering a simple programming interface to make it easy to create games and other graphic-intensive apps. The framework is supported on iOS, macOS, tvOS, and watchOS.	"SpriteKit," <i>Apple</i> , https://developer.apple.com/documentation/spritekit Trial Transcript, Testimony of Phillip Schiller, May 17, 2021, Trial at 2896:23-2897:4
	"Q. And what does SpriteKit do?	
	A. It is a library of tools for a developer who wants to ease the process of creating animations within their game or app. It creates -- you know, makes it easier for you to make objects move in your app or have physics when things bump into each other. SpriteKit handles those kind of interactions.	
	Q. And that 3D graphic or something else?	

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	Definitions & Usage	Notes and Sources
AR/Machine Learning APIs		
ARKit	<p>ARKit is a framework that combines device motion tracking, camera scene capture, advanced scene processing, and display conveniences to simplify the task of building an augmented reality experience. AR experiences are created using the front or rear camera of an iOS device.</p>	<p>"ARKit," <i>Apple</i>, https://developer.apple.com/documentation/arkit</p>
	<p>"Two of the most impressive features (human occlusion of CG and live MOCAP) are powered by tech in the new version of ARKit and were described as exclusive to iOS."</p>	<p>Trial Transcript, Testimony of Andrew Grant, May 5, 2021, Trial at 751:11-14</p>
AVFoundation	<p>"With ARKit, you don't need any special equipment or tracking markers; it just works."</p>	<p>Apple WWDC 2017 Keynote Presentation (June 9, 2017), https://www.youtube.com/watch?v=oqqlHdULqet0 at 1:29:56</p>
CoreML	<p>AVFoundation provides a framework for capturing, processing, synthesizing, controlling, importing, and exporting audiovisual media on Apple platforms by working with audiovisual assets, controlling device cameras, processing audio and configuring system audio interactions.</p>	<p>"AVFoundation," <i>Apple</i>, https://developer.apple.com/documentation/avfoundation</p>
	<p>Core ML is a framework used to integrate machine learning models into an app. It provides a unified representation for all models. A developer's app uses Core ML APIs and user data to make predictions, and to train or fine-tune models, all on a user's device.</p>	<p>"Core ML," <i>Apple</i>, https://developer.apple.com/documentation/coreml</p>
	<p>"CoreML3 supports the acceleration of more types of advanced, real-time machine learning models. With over 100 model layers now supported with Core ML, apps can use state-of-the-art models to deliver experiences that deeply understand vision, natural language, and speech like never before. And for the first time, developers can update machine learning models on-device using model personalization."</p>	<p>"Apple unveils groundbreaking new technologies for app development", <i>Apple</i>, https://www.apple.com/newsroom/2019/06/apple-unveils-groundbreaking-new-technologies-for-app-development/</p>
	<p>[describing APIs for face tracking, face detection, object tracking, natural language API, and others, that are built on CoreML, which] "provides high performance implementations of deep neural networks... and allow[] you to take models you've built with any of these popular third party tools, and using our machine learning model converter, execute them with tremendous performance on-device, and give you all the data privacy benefits and all the carefully-tuned compatibility with all of our platforms."</p>	<p>CoreML - Apple WWDC 2017 Keynote Presentation (June 9, 2017), https://www.youtube.com/watch?v=oqqlHdULqet0 at 1:23:05</p>

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	Definitions & Usage	Notes and Sources
Health and Fitness APIs		
HealthKit	<p>HealthKit provides a central repository for health and fitness data. Apps can communicate with HealthKit store to access and share data.</p> <p>“Over 16K apps use Apple health technologies like HealthKit, CareKit, and ResearchKit designed to protect patient privacy.”</p>	<p>“HealthKit,” <i>Apple</i>, https://developer.apple.com/documentation/healthkit</p> <p>“App Store”, <i>Apple</i>, https://www.apple.com/app-store/</p>
Interaction with Home		
HomeKit	HomeKit allows users to communicate with and control connected accessories in their home using the app. It provides a way to configure accessories and create actions to control them.	“HomeKit,” <i>Apple</i> , https://developer.apple.com/homekit/
Map APIs		
CarPlay	CarPlay is a framework that provides a user interface, generated and hosted by the system, that allows developers customize to display content from an app. CarPlay can be integrated into audio, communication, navigation, parking, EV-charging, and food-ordering apps.	“CarPlay,” <i>Apple</i> , https://developer.apple.com/documentation/carplay
WebKit	WebKit is a framework used to integrate web content into an app's native content, and allows developers to customize content interactions to meet app's needs.	“WebKit,” <i>Apple</i> , https://developer.apple.com/documentation/webkit

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APPLE U.S. PATENTS - EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS [1]

Schedule 3.2

Apple Patents [2]

U.S. Patents	771
U.S. Applications	413
Total	<u>1,184</u>

Notes and Sources:

[1] Innography Patent Database, accessed on 2/15/2021 and 7/20/2021.

I have not included duplicate patent grants and applications in the total count.

[2] Schedule 3.3

*Apple Inc. v Developers/Consumers***APPLE U.S. PATENTS - EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS BY SEARCH TERM [1]**

Schedule 3.3

Search Term	U.S. Patents	U.S. Applications	Total
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Commonly Used APIs -**APIs that permit the app to interact with the iOS device's UI and critical security elements**

[2] Architecture	79	67	146
[3] CoreFoundation	24	1	25
[4] Face ID	18	9	27
[5] Push Notification	71	27	98
[6] Security	356	193	549
[7] TouchID	25	25	50
[8] UIKit	22	6	28
[9] UserNotifications	12	3	15
[10] Xcode	31	15	46
[11] Authentication	47	37	84
[12] Authorize/Authorization	35	41	76
[13] Parental Controls	17	19	36

Commonly Used APIs - APIs that Permit Interaction with Device Hardware

[14] CoreMotion	4	1	5
[15] Haptics Engine	36	59	95

Connectivity APIs

[16] CloudKit	1	1	2
[17] WebKit	52	10	62
[18] Hypervisor	23	27	50
[19] Virtual Machines	47	14	61
[20] Network Extension	7	11	18
[21] SharePlay	3	1	4

*Apple Inc. v Developers/Consumers***APPLE U.S. PATENTS - EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS BY SEARCH TERM [1]**

Schedule 3.3

Search Term	U.S. Patents	U.S. Applications	Total
APIs that Provide Monetization Options			
[22] Apple Pay	22	23	45
[23] iAD	4	1	5
[24] In-App Purchase	5	12	17
[25] PassKit	-	1	1
[26] StoreKit	1	1	2
Graphics/Multimedia APIs			
[27] AudioToolbox	2	-	2
[28] AVFoundation	2	1	3
[29] CoreAudio	38	4	42
[30] CoreGraphics	72	7	79
[31] CoreMedia	26	4	30
[32] CoreVideo	19	1	20
[33] Metal	11	4	15
[34] QuartzCore	5	-	5
Gaming APIs			
[35] GameController	6	2	8
[36] GameKit	1	-	1
[37] ReplayKit	3	-	3
[38] SpriteKit	9	3	12
AR/Machine Learning APIs			
[39] ARKit	1	5	6
[40] AVFoundation	2	1	3
[41] CoreML	-	1	1

*Apple Inc. v Developers/Consumers***APPLE U.S. PATENTS - EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS BY SEARCH TERM [1]**

Schedule 3.3

<u>Search Term</u>	<u>U.S. Patents</u>	<u>U.S. Applications</u>	<u>Total</u>
Health and Fitness APIs			
[42] HealthKit	3	3	6
Interaction with Home			
[43] HomeKit	11	7	18
Map APIs			
[44] CarPlay	22	11	33
[45] WebKit	52	10	62

Notes and Search Functions:

- [1] Patents may occur in more than one search; Innography Patent Database, accessed on 2/13/2021 and 7/20/2021; all searches based on Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications. I have reviewed individual grants and applications to exclude patents that are not relevant.
- [2] @abstract,claims,title) @body "Architecture" AND "Multi-Touch" AND "App" AND "API".
- [3] @abstract,claims,title) @body "CoreFoundation" OR "Core Foundation"
- [4] @abstract,claims,title) @body "Face ID" OR "FaceID" OR ("Face Identification" NOT "Verified Face Identification").
- [5] @abstract,claims,title) @body "Push Notification" AND "App" AND "API"
- [6] @abstract,claims,title) @body "Security" AND "App" AND "API"
- [7] @abstract,claims,title) @body "Touch ID" OR "TouchID"
- [8] @abstract,claims,title) @body "UIKit" OR "UI Kit"
- [9] @abstract,claims,title) @body "UserNotification" OR "User Notification" AND "App".
- [10] @abstract,claims,title) @body "Xcode"
- [11] @abstract,claims,title) @body "Authentication" AND "App" AND "API" AND "Haptic" NOT "Home Media" NOT "Authentication Radio"~20.
- [12] @abstract,claims,title) @body "Authorize" OR "Authorization" AND "Certificate" AND "API" AND "App"
- [13] @abstract,claims,title) @body "Parental Controls" AND "App"
- [14] @abstract,claims,title) @body "CoreMotion" OR "Core Motion"
- [15] @abstract,claims,title) @body "Haptics Engine" AND ("App" or "Application") -- "Haptics Engine" AND ("App" or "Application") AND "Interface".
- [16] @abstract,claims,title) @body "CloudKit" OR "Cloud Kit".
- [17] @abstract,claims,title) @body "WebKit" OR "Web Kit".
- [18] @abstract,claims,title) @body "Hypervisor" AND ("App" OR "Application")
- [19] @abstract,claims,title) @body "Virtual Machines" AND App
- [20] @abstract,claims,title) @body "Network Extension"
- [21] @abstract,claims,title) @body "SharePlay" OR "Share Play"

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS BY SEARCH TERM [1]

Schedule 3.3

- [22] @(@abstract,claims,title) @body "Apple Pay"
- [23] @(@abstract,claims,title) @body "iAD".
- [24] @(@abstract,claims,title) @body "In-App Purchase".
- [25] @(@abstract,claims,title) @body "PassKit" OR "Pass Kit"
- [26] @(@abstract,claims,title) @body "StoreKit" OR "Store Kit"
- [27] @(@abstract,claims,title) @body "AudioToolbox" OR "Audio Toolbox"
- [28] @(@abstract,claims,title) @body "AVFoundation" OR "AV Foundation"
- [29] @(@abstract,claims,title) @body "CoreAudio" OR "Core Audio".
- [30] @(@abstract,claims,title) @body "CoreGraphic" OR "Core Graphic".
- [31] @(@abstract,claims,title) @body "CoreMedia" OR "Core Media"
- [32] @(@abstract,claims,title) @body "CoreVideo" OR "Core Video".
- [33] @(@abstract,claims,title) @body ("Metal" AND "Framework" AND "App" NOT ("Metal - Oxide Semiconductor" OR "Metal Hydride NOT "Metal Battery")~5 NOT "Metal Material")~5.
- [34] @(@abstract,claims,title) @body "QuartzCore" OR "Quartz Core Framework"
- [35] @(@abstract,claims,title) @body "GameController" OR "Game Controller" AND ("API" OR "App").
- [36] @(@abstract,claims,title) @body "GameKit" OR "Game Kit".
- [37] @(@abstract,claims,title) @body "ReplayKit"
- [38] @(@abstract,claims,title) @body "SpriteKit"
- [39] @(@abstract,claims,title) @body "ARKit" OR "AR Kit"
- [40] @(@abstract,claims,title) @body "AVFoundation" OR "AV Foundation"
- [41] @(@abstract,claims,title) @body "Core ML" OR "Core ML"
- [42] @(@abstract,claims,title) @body "HealthKit" OR "Health Kit"
- [43] @(@abstract,claims,title) @body "HomeKit" OR "Home Kit".
- [44] @(@abstract,claims,title) @body "CarPlay" or "Car Play"
- [45] @(@abstract,claims,title) @body "WebKit" OR "Web Kit".

Apple Inc. v Developers/Consumers

PROCESS FOR EXEMPLARY APPLE DEVELOPER FRAMEWORKS AND TOOLS PATENT SEARCH

Schedule 3.4

Identify search terms [1]



Test results of each individual search term through initial review of select grants and applications [2]



Determine if limitations to search terms are required



Test results of each search term with limitations through manual review of a selection of grants and applications



Conduct a combined search with all terms and limitations and remove grants and applications not filtered by limitations found not to be relevant

Notes and Sources:

[1] Schedule 3.3

[2] Results of each search term were reviewed individually and search terms were refined accordingly. Within Innography, a combination of search syntax and Booleans were used to filter down the broad results of certain keywords. Certain search terms were excluded from the search function and/or results because they were too broad or did not result in relevant patents. The final search function is shown in Schedule 3.2.

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - SEARCH TERM “iOS” [1]

Schedule 4.0

**Apple Patents
with “iOS” [2]**

U.S. Patents	1,237
U.S. Applications	559
Total	<u><u>1,796</u></u>

Notes and Sources:

[1] Innography Patent Database, accessed on 2/12/2021

[2] Search Terms and Function: Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications;
@(abstract,claims,title) @body = “iOS”

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - SEARCH TERMS “iOS” AND “MULTI-TOUCH” [1]

Schedule 4.1

Apple Patents with “iOS” and “Multi- Touch” [2]	
U.S. Patents	554
U.S. Applications	392
Total	946

Notes and Sources:

[1] Innography Patent Database, accessed on 2/12/2021

[2] Search Terms and Function: Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications;
@(abstract,claims,title) @body = “iOS” AND “Multi-Touch”

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - SEARCH TERM “XCODE” [1]

Schedule 4.2

Apple Patents with “Xcode” [2]	
U.S. Patents	31
U.S. Applications	15
Total	46

Notes and Sources:

[1] Innography Patent Database, accessed on 2/13/2021

[2] Search Terms and Function: Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications; @abstract,claims,title) @body “Xcode.” I have reviewed individual grants and applications to exclude patents that are not relevant.

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - SEARCH TERMS “CLOUDKIT,” “HOMEKIT,” “UIKIT,” OR “WEBKIT” [1]

Schedule 4.3

<u>Apple Patents [2]</u>	
U.S. Patents	86
U.S. Applications	<u>22</u>
Total	<u><u>108</u></u>

Notes and Sources:

[1] Innography Patent Database, accessed on 2/15/2021.

[2] Search Terms and Function: Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications; @abstract,claims,title) @body (“CloudKit” OR “Cloud Kit”) OR (“HomeKit” OR “Home Kit”) OR (“UIKit” OR “UI Kit”) OR (“WebKit” OR “Web Kit”). I have reviewed individual grants and applications to exclude patents that are not relevant.

Apple Inc. v Developers/Consumers

APPLE U.S. PATENTS - SEARCH TERMS “COREAUDIO,” “COREGRAPHICS,” “COREVIDEO,” OR “IN-APP PURCHASES” [1]

Schedule 4.4

<u>Apple Patents [2]</u>	
U.S. Patents	112
U.S. Applications	22
Total	<u>134</u>

Notes and Sources:

[1] Innography Patent Database, accessed on 2/15/2021.

[2] Search Terms and Function: Organization: Apple Inc.; Status: Active; Jurisdiction: United States Grants; United States Applications; @abstract,claims,title) @body (“CoreAudio” OR “CoreGraphic” OR “CoreVideo” OR “Core Audio” OR “Core Graphic” OR “Core Video” OR “In-App Purchase”). I have reviewed individual grants and applications to exclude patents that are not relevant.

*Apple Inc. v Developers/Consumers***APPLE APP STORE AVAILABLE APPS AND CUMULATIVE DOWNLOADS [1]**

Schedule 5.0

Date	Available Apps	Cumulative Downloads	Source
07/11/2008	500+	-	[1]
07/14/2008	800+	10,000,000+	[2]
09/09/2008	3,000+	100,000,000+	[3]
01/16/2009	15,000+	500,000,000+	[4]
03/17/2009	25,000+	800,000,000	[5][6]
04/24/2009	35,000+	1,000,000,000	[7]
06/08/2009	50,000+	1,000,000,000+	[8]
07/14/2009	65,000+	1,500,000,000+	[9]
09/28/2009	85,000+	2,000,000,000+	[10]
11/04/2009	100,000+	2,000,000,000+	[10][11]
01/27/2010	140,000+	3,000,000,000+	[12][13]
06/07/2010	225,000+	5,000,000,000+	[14]
09/01/2010	250,000+	6,500,000,000	[15][16]
10/20/2010	300,000	7,000,000,000	[17][18]
01/22/2011	350,000+	10,000,000,000+	[19]
07/07/2011	425,000+	15,000,000,000+	[20]
10/18/2011	500,000+	18,000,000,000+	[21]
03/05/2012	550,000+	25,000,000,000+	[22]
06/11/2012	650,000	30,000,000,000	[23]
09/12/2012	700,000+	30,000,000,000	[23][24]
01/07/2013	775,000+	40,000,000,000+	[25]
01/28/2013	800,000+	40,000,000,000+	[26]
04/23/2013	850,000+	45,000,000,000+	[27]
05/16/2013	850,000+	50,000,000,000+	[28]
06/10/2013	900,000+	50,000,000,000+	[28][29]
10/22/2013	1,000,000+	60,000,000,000+	[30]
06/02/2014	1,200,000+	75,000,000,000+	[31]
09/09/2014	1,300,000+	75,000,000,000+	[31][32]
01/08/2015	1,400,000+	75,000,000,000+	[31][33]

Apple Inc. v Developers/Consumers

APPLE APP STORE AVAILABLE APPS AND CUMULATIVE DOWNLOADS [1]

Schedule 5.0

Date	Available Apps	Cumulative Downloads	Source
06/08/2015	1,500,000+	100,000,000,000+	[34]
06/13/2016	2,000,000+	125,000,000,000+	[35]
01/05/2017	2,100,000+	130,000,000,000+	[35][36]
06/05/2017	n/a	180,000,000,000+	[37]
11/18/2020	1,800,000	180,000,000,000+	[37][38]

Notes and Sources:

- [1] “iPhone 3G on Sale Tomorrow,” *Apple*, July 10, 2008, <https://www.apple.com/newsroom/2008/07/10iPhone-3G-on-Sale-Tomorrow/>.
- [2] “iPhone App Store Downloads Top 10 Million in First Weekend,” *Apple*, July 14, 2008, <https://www.apple.com/newsroom/2008/07/14iPhone-App-Store-Downloads-Top-10-Million-in-First-Weekend/>.
- [3] “App Store Downloads Top 100 Million Worldwide,” *Apple*, September 9, 2008, <https://www.apple.com/newsroom/2008/09/09App-Store-Downloads-Top-100-Million-Worldwide/>.
- [4] Apple Inc. FQ1 2009 Earnings Call Transcript, January 21, 2009, p. 21.
- [5] “Apple Previews Developer Beta of iPhone OS 3.0,” *Apple*, March 17, 2009, <https://www.apple.com/newsroom/2009/03/17Apple-Previews-Developer-Beta-of-iPhone-OS-3-0/>.
- [6] “Apple Opens Up More Ways to Get Paid on the iPhone, Adds Key New Features. Apps Hit 800 Million Downloads.” *TechCrunch*, March 17, 2009, <https://techcrunch.com/2009/03/17/phone-apps-hit-800-million-downloads/>.
- [7] “Apple’s Revolutionary App Store Downloads Top One Billion in Just Nine Months,” *Apple*, April 24, 2009, <https://www.apple.com/newsroom/2009/04/24Apples-Revolutionary-App-Store-Downloads-Top-One-Billion-in-Just-Nine-Months/>.
- [8] “Apple Announces the New iPhone 3GS—The Fastest, Most Powerful iPhone Yet,” *Apple*, June 8, 2009, <https://www.apple.com/newsroom/2009/06/08Apple-Announces-the-New-iPhone-3GS-The-Fastest-Most-Powerful-iPhone-Yet/>.
- [9] “Apple’s App Store Downloads Top 1.5 Billion in First Year,” *Apple*, July 14, 2009, <https://www.apple.com/newsroom/2009/07/14Apples-App-Store-Downloads-Top-1-5-Billion-in-First-Year/>.
- [10] “Apple’s App Store Downloads Top Two Billion,” *Apple*, September 28, 2009, <https://www.apple.com/newsroom/2009/09/28Apples-App-Store-Downloads-Top-Two-Billion/>.
- [11] “Apple Announces Over 100,000 Apps Now Available on the App Store,” *Apple*, November 4, 2009, <https://www.apple.com/newsroom/2009/11/04Apple-Announces-Over-100-000-Apps-Now-Available-on-the-App-Store/>.

Apple Inc. v Developers/Consumers

APPLE APP STORE AVAILABLE APPS AND CUMULATIVE DOWNLOADS [1]

Schedule 5.0

- [12] “Apple’s App Store Downloads Top Three Billion,” *Apple*, January 5, 2010, <https://www.apple.com/newsroom/2010/01/05Apples-App-Store-Downloads-Top-Three-Billion/>.
- [13] “Apple Launches iPad,” *Apple*, January 27, 2010, <https://www.apple.com/newsroom/2010/01/27Apple-Launches-iPad/>.
- [14] “Apple Presents iPhone 4,” *Apple*, June 7, 2010, <https://www.apple.com/newsroom/2010/06/07Apple-Presents-iPhone-4/>.
- [15] “Apple Introduces New iPod touch,” *Apple*, September 1, 2010, <https://www.apple.com/newsroom/2010/09/01Apple-Introduces-New-iPod-touch/>.
- [16] “Jobs: 6.5 Billion Apps Downloaded From The App Store,” *TechCrunch*, September 1, 2010, <https://techcrunch.com/2010/09/01/jobs-6-5-billion-apps-downloaded-from-app-store/>.
- [17] Apple Inc. FQ4 2010 Earnings Call Transcript, October 18, 2010, p. 7.
- [18] “App Store Hits 7 Billion Downloads,” *TechCrunch*, October 20, 2010, <https://techcrunch.com/2010/10/20/app-store-hits-7-billion-downloads/>.
- [19] “Apple’s App Store Downloads Top 10 Billion,” *Apple*, January 22, 2011, <https://www.apple.com/newsroom/2011/01/22Apples-App-Store-Downloads-Top-10-Billion/>.
- [20] “Apple’s App Store Downloads Top 15 Billion,” *Apple*, July 7, 2011, <https://www.apple.com/newsroom/2011/07/07Apples-App-Store-Downloads-Top-15-Billion/>.
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- [23] “Apple: 30B apps downloaded, 400M App Store accounts set up,” *CNET*, June 11, 2012, <https://www.cnet.com/news/apple-30b-apps-downloaded-400m-app-store-accounts-set-up/>.
- [24] “Apple Introduces New iPod touch & iPod nano,” *Apple*, September 12, 2012, <https://www.apple.com/newsroom/2012/09/12Apple-Introduces-New-iPod-touch-iPod-nano/>.
- [25] “App Store Tops 40 Billion Downloads with Almost Half in 2012,” *Apple*, January 7, 2013, <https://www.apple.com/newsroom/2013/01/07App-Store-Tops-40-Billion-Downloads-with-Almost-Half-in-2012/>.
- [26] “Apple Updates iOS to 6.1,” *Apple*, January 28, 2013, <https://www.apple.com/newsroom/2013/01/28Apple-Updates-iOS-to-6-1/>.
- [27] Apple Inc. FQ2 2013 Earnings Call Transcript, April 23, 2013, p. 7.
- [28] “Apple’s App Store Marks Historic 50 Billionth Download,” *Apple*, May 16, 2013, <https://www.apple.com/newsroom/2013/05/16Apples-App-Store-Marks-Historic-50-Billionth-Download/>.
- [29] “Apple Unveils iOS 7,” *Apple*, June 10, 2013, <https://www.apple.com/newsroom/2013/06/10Apple-Unveils-iOS-7/>.
- [30] “Apple Announces iPad Air - Dramatically Thinner, Lighter & More Powerful iPad,” *Apple*, October 22, 2013, <https://www.apple.com/newsroom/2013/10/23Apple-Announces-iPad-Air-Dramatically-Thinner-Lighter-More-Powerful-iPad/>.

Apple Inc. v Developers/Consumers

APPLE APP STORE AVAILABLE APPS AND CUMULATIVE DOWNLOADS [1]

Schedule 5.0

- [31] “Apple Releases iOS 8 SDK With Over 4,000 New APIs,” *Apple*, June 2, 2014, <https://www.apple.com/newsroom/2014/06/02Apple-Releases-iOS-8-SDK-With-Over-4-000-New-APIs/>.
- [32] “Apple Announces iOS 8 Available September 17,” *Apple*, September 9, 2014, <https://www.apple.com/newsroom/2014/09/09Apple-Announces-iOS-8-Available-September-17/>.
- [33] “App Store Rings in 2015 with New Records,” *Apple*, January 8, 2015, <https://www.apple.com/newsroom/2015/01/08App-Store-Rings-in-2015-with-New-Records/>.
- [34] “iTunes App Store Passes 1.5M Apps, 100B Downloads, \$30B Paid to Developers to Date,” *TechCrunch*, June 8, 2015, <https://techcrunch.com/2015/06/08/itunes-app-store-passes-1-5m-apps-100b-downloads-30b-paid-to-developers/>.
- [35] “Apple’s App Store hits 2M apps, 130B downloads, \$50B paid to developers,” *TechCrunch*, June 13, 2016, <https://techcrunch.com/2016/06/13/apples-app-store-hits-2m-apps-130b-downloads-50b-paid-to-developers/>.
- [36] “Apple’s App Store just had the most successful month of sales ever,” *The Verge*, January 5, 2017, <https://www.theverge.com/2017/1/5/14173328/apple-december-2016-app-store-record-phil-schiller>.
- [37] “Apple unveils all-new App Store,” *Apple*, June 5, 2017, <https://www.apple.com/newsroom/2017/06/apple-unveils-all-new-app-store/>.
- [38] “Apple Announces App Store Small Business Program,” *Apple*, November 18, 2020, <https://www.apple.com/newsroom/2020/11/apple-announces-app-store-small-business-program/>.

Apple Inc. v Developers/Consumers

APPLE'S R&D EXPENSES FY 2005 - FY 2020 [1]

Schedule 6.0

(in millions USD)	FY 2005 [2]	FY 2006 [3]	FY 2007 [3]	FY 2008 [3]	FY 2009 [4]	FY 2010 [4]	FY 2011 [4]	FY 2012 [5]	
R&D Expenses	\$ 534	\$ 712	\$ 782	\$ 1,109	\$ 1,333	\$ 1,782	\$ 2,429	\$ 3,381	
(in millions USD)	FY 2013 [5]	FY 2014 [5]	FY 2015 [6]	FY 2016 [6]	FY 2017 [6]	FY 2018 [7]	FY 2019 [7]	FY 2020 [7]	Total
R&D Expenses	\$ 4,475	\$ 6,041	\$ 8,067	\$ 10,045	\$ 11,581	\$ 14,236	\$ 16,217	\$ 18,752	\$ 101,476

Notes and Sources:

- [1] Based on Apple fiscal year ended the last Saturday in September of the stated year. For example, FY 2005 starts September 26, 2004 and ends September 24, 2005.
- [2] Apple Inc. SEC Form 10-K for the fiscal year ending September 24, 2005, p. 38.
- [3] Apple Inc. SEC Form 10-K for the fiscal year ending September 27, 2008, p. 46.
- [4] Apple Inc. SEC Form 10-K for the fiscal year ending September 24, 2011, p. 35.
- [5] Apple Inc. SEC Form 10-K for the fiscal year ending September 27, 2014, p. 33.
- [6] Apple Inc. SEC Form 10-K for the fiscal year ending September 30, 2017, p. 27.
- [7] Apple Inc. SEC Form 10-K for the fiscal year ending September 26, 2020, p. 23.

Appendix D

HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY
SUBJECT TO PROTECTIVE ORDER

Appendix D - Glossary

iOS and macOS

API (Application Programming Interface)¹ - Software intermediary that allows two applications to talk to each other, without having to know how each application works. In other words, it acts as a translator that returns an answer or a set of data from a request in a code language the program can understand. Each API relates to a specific operating system framework.

App Store² – Introduced on July 10, 2008;³ platform where developers deliver apps and services across iPhone, iPad, Mac, Apple TV, and Apple Watch for customers in 175 regions.

App Store Connect⁴ – Introduced on June 6, 2018;⁵ suite of tools that allow developers to upload, submit, and manage apps on the App Store. Also allows developers to view sales reports, access app analytics, invite users to test apps with TestFlight, add IAP, etc.

AudioToolbox⁶ - Available from iOS 2 (July 11, 2008) and macOS 10.0 (March 24, 2001);⁷ provides interfaces for recording, playback, and stream parsing. Used to record or play audio, convert formats, parse audio streams, and configure your audio session.

CloudKit⁸ - Available from iOS 8 (September 17, 2014) and macOS 10.10 (October 16, 2014);⁹ provides interfaces for moving data between app and iCloud containers. CloudKit is used to store an app's existing data in the cloud so that the user can access it on multiple devices. Data can also be stored in a public area where all users can access it.

¹ “What is an API?,” *Red Hat*, <https://www.redhat.com/en/topics/api/what-are-application-programming-interfaces>; “What is an API? Application programming interfaces explained,” Jonathan Freeman, *InfoWorld*, August 8, 2019, <https://www.infoworld.com/article/3269878/what-is-an-api-application-programming-interfaces-explained.html>.

² “Making the Most of the App Store,” *Apple*, <https://developer.apple.com/app-store/>; “The apps you love. From a place you can trust,” *Apple*, <https://www.apple.com/app-store/>.

³ “The App Store turns 10,” *Apple*, July 5, 2018, <https://www.apple.com/newsroom/2018/07/app-store-turns-10/>.

⁴ “You Apps on the App Store,” *Apple*, <https://developer.apple.com/app-store-connect/>.

⁵ “Introducing App Store Connect,” *Apple*, June 6, 2018, <https://developer.apple.com/news/?id=06042018>.

⁶ “Audio Toolbox,” *Apple*, <https://developer.apple.com/documentation/audiotoolbox>.

⁷ “Audio Toolbox,” *Apple*, <https://developer.apple.com/documentation/audiotoolbox>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁸ “CloudKit,” *Apple*, <https://developer.apple.com/documentation/cloudkit>.

⁹ “CloudKit,” *Apple*, <https://developer.apple.com/documentation/cloudkit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

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CoreAudio¹⁰ - Available from iOS 2 (July 11, 2008) and macOS 10.5 (October 26, 2007);¹¹ digital audio infrastructure that includes a set of software frameworks to handle audio needs. Core Audio capabilities include recording, playback, sound effects, positioning, format conversion, and file stream parsing.

CoreGraphics¹² - Available from iOS 2 (July 11, 2008) and macOS 10.8 (July 25, 2012);¹³ based on the Quartz advanced drawing engine. Provides low-level, lightweight 2D rendering with high-fidelity output. Used to handle path-based drawing, transformations, color management, offscreen rendering, patterns, gradients and shadings, image data management, image creation, and image masking, as well as PDF document creation, display, and parsing.

Core ML¹⁴ - Available from iOS 11 (September 19, 2017) and macOS 10.13 (September 25, 2017);¹⁵ used to integrate machine learning models into an app.

CoreMotion¹⁶ - Available from iOS 4 (June 22, 2010) and macOS 10.15 (October 7, 2019);¹⁷ used to process accelerometer, gyroscope, pedometer, magnetometer, barometer, and environment-related events.

¹⁰ “Core Audio Overview - Introduction,” *Apple*, <https://developer.apple.com/library/archive/documentation/MusicAudio/Conceptual/CoreAudioOverview/Introduction/Introduction.html>; “What is Core Audio?,” *Apple*, <https://developer.apple.com/library/archive/documentation/MusicAudio/Conceptual/CoreAudioOverview/WhatisCoreAudio/WhatisCoreAudio.html>.

¹¹ “Core Audio Frameworks,” *Apple*, https://developer.apple.com/library/archive/documentation/MusicAudio/Conceptual/CoreAudioOverview/CoreAudioFrameworks/CoreAudioFrameworks.html#/apple_ref/doc/uid/TP40003577-CH9-SW1; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

¹² “Core Graphics,” *Apple*, <https://developer.apple.com/documentation/coregraphics>.

¹³ “Core Graphics,” *Apple*, <https://developer.apple.com/documentation/coregraphics>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

¹⁴ “Core ML,” *Apple*, <https://developer.apple.com/documentation/coreml>.

¹⁵ “Core ML,” *Apple*, <https://developer.apple.com/documentation/coreml>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

¹⁶ “Core Motion,” *Apple*, <https://developer.apple.com/documentation/coremotion>.

¹⁷ “Core Motion,” *Apple*, <https://developer.apple.com/documentation/coremotion>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

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CoreVideo¹⁸ - Available from iOS 4 (June 22, 2010) and macOS 10.4 (April 29, 2005);¹⁹ provides pipeline model for digital video. Simply, the framework allows to process digital video—including manipulation of individual frames—using a pipeline-based API and support for both Metal and OpenGL.

DeviceCheck²⁰ - Available from iOS 11 (September 19, 2017) and macOS 10.15 (October 7, 2019);²¹ services consist of both a framework interface that can be accessed from an app and an Apple server interface that can be accessed from developer's own server. Used to reduce fraudulent use of services by managing device state and asserting app integrity.

Framework²² - Hierarchical directory that encapsulates shared resources, such as a dynamic shared library, nib files, image files, localized strings, header files, and reference documentation in a single package. Multiple applications can use all of these resources simultaneously. The system loads them into memory as needed and shares the one copy of the resource among all applications whenever possible. A framework bundle is a standard directory that the user can navigate. This makes it easier for developers to browse the framework contents and view any included documentation and header files.

GameKit²³ - Available from iOS 3 (June 17, 2009) and macOS 10.8 (July 25, 2012);²⁴ used to implement Game Center social-gaming network features. Game Center is an Apple service that provides a single account that identifies players across all their games and devices. It enables players to interact with friends, compare leaderboard ranks, earn achievements, and participate in multiplayer games.

iOS²⁵ - Unix-based operating system created and released by Apple in June 2007; acronym for iPhone Operating System.

¹⁸ “Core Video,” *Apple*, <https://developer.apple.com/documentation/corevideo>.

¹⁹ “Core Video,” *Apple*, <https://developer.apple.com/documentation/corevideo>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

²⁰ “DeviceCheck,” *Apple*, <https://developer.apple.com/documentation/devicecheck>.

²¹ “DeviceCheck,” *Apple*, <https://developer.apple.com/documentation/devicecheck>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

²² “What are Frameworks?,” *Apple*, <https://developer.apple.com/library/archive/documentation/MacOSX/Conceptual/BPFrameworks/Concepts/WhatAreFrameworks.html>.

²³ “GameKit,” *Apple*, <https://developer.apple.com/documentation/gamekit>.

²⁴ “GameKit,” *Apple*, <https://developer.apple.com/documentation/gamekit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

²⁵ “Apple iOS,” *Apple*, <https://www.investopedia.com/terms/a/apple-ios.asp>.

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In-App Purchase (IAP)²⁶ - Available from iOS 3 on June 17, 2009;²⁷ feature that allows customers extra contents and features, including premium content, digital goods, and subscriptions, directly within the app. Xcode is needed to be enabled for IAP. There are four types of IAP: Consumable, Non-Consumable, Auto-Renewable Subscriptions, and Non-Renewing Subscriptions.

Metal²⁸ - Available from iOS 8 (September 17, 2014) and macOS 10.11 (September 30, 2015);²⁹ framework directly communicates with the graphics processors (GPU) to render advanced 3D graphics and perform data-parallel computations. Simply, it maximizes graphics and compute potential of OS.

PassKit (Apple Pay and Wallet)³⁰ - Available from iOS 6 (September 19, 2012) and macOS 11.0 (November 12, 2020);³¹ allows processing of Apple Pay payments in apps and creating, distributing, and managing of passes for the Wallet app.

Reality Composer³² - Available from iOS 13 (September 19, 2019) and macOS 10.15 (October 7, 2019);³³ tool for prototyping and producing content for AR experiences. Converts existing 3D models to USDZ to work seamlessly with tools and on all AR-enabled iPhone and iPad devices.

²⁶ “In-App Purchase,” *Apple*, <https://developer.apple.com/in-app-purchase/>.

²⁷ “Apple Previews Developer Beta of iPhone OS 3.0,” *Apple*, March 17, 2009, <https://www.apple.com/newsroom/2009/03/17Apple-Previews-Developer-Beta-of-iPhone-OS-3-0/>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

²⁸ “Metal,” *Apple*, <https://developer.apple.com/metal/>; “Metal,” *Apple*, <https://developer.apple.com/documentation/metal>.

²⁹ “Metal,” *Apple*, <https://developer.apple.com/documentation/metal>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

³⁰ “PassKit (Apple Pay and Wallet),” *Apple*, <https://developer.apple.com/documentation/passkit?language=occ>.

³¹ “PassKit (Apple Pay and Wallet),” *Apple*, <https://developer.apple.com/documentation/passkit?language=occ>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

³² “AR Creation Tools,” *Apple*, <https://developer.apple.com/augmented-reality/tools/>.

³³ “RealityKit and Reality Composer, AR tools from Apple: A cheat sheet,” Cory Bohon, *Tech Republic*, June 8, 2019, <https://www.techrepublic.com/article/realitykit-and-reality-composer-ar-tools-from-apple-a-cheat-sheet/>; “RealityKit,” *Apple*, <https://developer.apple.com/documentation/realitykit/>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

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ReplayKit³⁴ – Available from iOS 9 (September 16, 2015) and macOS 11.0 (November 12, 2020);³⁵ allows recording or streaming of video from the device screen, and audio from the app or microphone. With this framework developers can enable app users to share recordings and broadcast live content.

SDK (Software Development Kit)³⁶ - Set of tools provided by the manufacturer of a hardware platform, operating system (OS), or programming language. SDKs help developers create applications specific to that platform, system, or programming language.

Security³⁷ - Available from iOS 2 (July 11, 2008) and macOS 10.0 (March 24, 2001);³⁸ allows to protect information, establish trust, and control access to software.

Swift³⁹ - Initially released on June 2, 2014;⁴⁰ programming language created by Apple for creating macOS, iOS, watchOS, etc. apps. Swift is open source.

Swift Playgrounds⁴¹ - Available for iPad in 2016 and Mac on February 12, 2020;⁴² an app that can be used to help developers learn the Swift programming language.

SwiftUI⁴³ - Available from iOS 13 (September 19, 2019) and macOS 10.15 (October 7, 2019);⁴⁴ provides view, controls, and layout structures for declaring app's user interface. Also provides event handlers for delivering taps, gestures, and other types of input to apps.

³⁴ “ReplayKit,” *Apple*, <https://developer.apple.com/documentation/replaykit>.

³⁵ “ReplayKit,” *Apple*, <https://developer.apple.com/documentation/replaykit/>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

³⁶ “What is an SDK?,” *Red Hat*, <https://www.redhat.com/en/topics/cloud-native-apps/what-is-SDK>.

³⁷ “Security,” *Apple*, <https://developer.apple.com/documentation/security>.

³⁸ “Security,” *Apple*, <https://developer.apple.com/documentation/security>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

³⁹ “Swift,” *Apple*, <https://developer.apple.com/swift/>; “Swift. A powerful open language that lets everyone build amazing apps,” *Apple*, <https://www.apple.com/swift/>.

⁴⁰ “Swift Has Reached 1.0,” *Apple*, September 9, 2014, <https://developer.apple.com/swift/blog/?id=14>.

⁴¹ Epic Games, Inc.’s Responses and Objections to Apple Inc.’s First Set of Interrogatories, December 11, 2020, p. 17.

⁴² “Getting Started with Swift,” *Apple*, <https://developer.apple.com/videos/play/wwdc2016/404/>; “Apple’s free learn-to-code Swift Playgrounds sandbox arrives on Mac,” Taylor Lyles, *The Verge*, February 12, 2020, <https://www.theverge.com/2020/2/12/21135573/apple-swift-playgrounds-coding-app-available-mac>.

⁴³ “SwiftUI,” *Apple*, <https://developer.apple.com/documentation/swiftui/>.

⁴⁴ “SwiftUI,” *Apple*, <https://developer.apple.com/documentation/swiftui/>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

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WebKit⁴⁵ - Available from iOS 8 (September 17, 2014) and macOS 10.2 (August 24, 2002);⁴⁶ used to integrate web content seamlessly into an app; customize content interactions; display rich web content using HTML, CSS, and JavaScript; handle the incremental loading of page content; display multiple MIME types and compound frame elements; navigate between pages of content; manage a forward-back list of recently visited pages.

WidgetKit⁴⁷ - Available from iOS 14 (September 17, 2020) and macOS 11.0 (November 12, 2020);⁴⁸ provides users ready access to content in apps by putting widgets on the iOS Home screen or macOS Notification Center.

iOS

ARKit⁴⁹ - Available from iOS 11 (September 19, 2017);⁵⁰ integrates iOS device camera and motion features to produce AR experiences in apps or games.

CareKit⁵¹ - Available since April 2016;⁵² provides users the ability to manage and understand their health. CareKit apps can digitalize prescriptions, provide health data and trends, and allow users to connect with care providers.

HealthKit⁵³ - Available from iOS 8 (September 17, 2014);⁵⁴ provides a central repository for health and fitness data. Apps can communicate with HealthKit store to access and share data.

⁴⁵ “WebKit,” *Apple*, <https://developer.apple.com/documentation/webkit>.

⁴⁶ “WebKit,” *Apple*, <https://developer.apple.com/documentation/webkit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁴⁷ “WidgetKit,” *Apple*, <https://developer.apple.com/documentation/widgetkit?language=occ>.

⁴⁸ “WidgetKit,” *Apple*, <https://developer.apple.com/documentation/widgetkit?language=occ>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁴⁹ “ARKit,” *Apple*, <https://developer.apple.com/documentation/arkit>.

⁵⁰ “ARKit,” *Apple*, <https://developer.apple.com/documentation/arkit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁵¹ “CareKit,” *Apple*, <https://developer.apple.com/documentation/carekit>.

⁵² “Apple launches CareKit to let people develop their own health apps,” Loren Grush and Arielle Duhaime-Ross, *The Verge*, March 21, 2016, <https://www.theverge.com/2016/3/21/11277466/apple-carekit-announced-health-care-software-platform>.

⁵³ “HealthKit,” *Apple*, <https://developer.apple.com/documentation/healthkit>.

⁵⁴ “HealthKit,” *Apple*, <https://developer.apple.com/documentation/healthkit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

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HomeKit⁵⁵ - Available from iOS 8 (September 17, 2014);⁵⁶ allows users to communicate with and control connected accessories in their home using the app. Provides a way to configure accessories and create actions to control them.

iAd⁵⁷ - Available from iOS 4 (June 22, 2010);⁵⁸ discontinued mobile advertising platform. Was used to attribute app downloads that originated from Apple Search Ads campaigns on iOS devices.

ResearchKit⁵⁹ - Available since 2015;⁶⁰ allows creation of visual consent flows, real-time dynamic active tasks, and surveys using a variety of customizable modules. Has allowed researchers to launch studies through apps.

SiriKit⁶¹ - Available from iOS 10 (September 13, 2016);⁶² implement app extensions that integrates services with Siri and Maps.

TestFlight⁶³ - Available from iOS 8 (September 17, 2014);⁶⁴ allows developers to beta test apps and collect feedback before releasing on the App Store.

UIAction⁶⁵ - Available from iOS 13 (September 19, 2019);⁶⁶ A menu element that performs its action in a closure.

⁵⁵ “HomeKit,” *Apple*, <https://developer.apple.com/homekit/>.

⁵⁶ “HomeKit,” *Apple*, <https://developer.apple.com/documentation/homekit/>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁵⁷ “About the iAd App Network Shutdown,” *Apple*, <https://developer.apple.com/support/iad/>; “iAd,” *Apple*, <https://developer.apple.com/documentation/iad>.

⁵⁸ “iAd,” *Apple*, <https://developer.apple.com/documentation/iad?language=objc>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁵⁹ “ResearchKit,” *Apple*, <https://developer.apple.com/researchkit/>; “Important discoveries are at your fingertips,” *Apple*, <https://www.researchandcare.org/researchkit/>

⁶⁰ “Important discoveries are at your fingertips,” *Apple*, <https://www.researchandcare.org/researchkit/>.

⁶¹ “SiriKit,” *Apple*, <https://developer.apple.com/documentation/sirikit>.

⁶² “SiriKit,” *Apple*, <https://developer.apple.com/documentation/sirikit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁶³ “Beta Testing Made Simple with TestFlight,” *Apple*, <https://developer.apple.com/testflight>.

⁶⁴ “Apple Releases iOS 8 SDK With Over 4,000 New APIs,” *Apple*, June 2, 2014, <https://www.apple.com/newsroom/2014/06/02Apple-Releases-iOS-8-SDK-With-Over-4-000-New-APIs>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁶⁵ “UIAction,” *Apple*, <https://developer.apple.com/documentation/uikit/uiaction>.

⁶⁶ “UIAction,” *Apple*, <https://developer.apple.com/documentation/uikit/uiaction>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

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UIKit⁶⁷ - Available from iOS 2 (July 11, 2008);⁶⁸ provides infrastructure for iOS or tvOS apps. Like Foundation, UIKit defines classes, protocols, functions, data types, and constants. It defines the core components of an iOS application, from labels and buttons to table views and navigation controllers. Features offered include: window and view architecture, event handling infrastructure (i.e., Multi-Touch), animation support, document support, drawing and printing support, information about the current device, text management and display, search support, accessibility support, app extension support, and resource management, and provides the main run loop to manage interactions among the user, the system, and app.

macOS

Cocoa⁶⁹ - Available from macOS 10.0 (March 24, 2001);⁷⁰ provides a runtime environment for application running in OS X and iOS. Most of the applications in OS X and iOS are Cocoa applications.

Create ML⁷¹ - Available from macOS 10.14 (September 28, 2018);⁷² used to create and train custom machine learning models for use on apps. Models can be trained to perform tasks like recognizing images, extracting meaning from text, or finding relationships between numerical values.

OpenGL⁷³ - Available from macOS 10.0 (March 24, 2001);⁷⁴ deprecated in 2018. Open, cross-platform graphics standard with broad industry support.

⁶⁷ “UIKit,” *Apple*, <https://developer.apple.com/documentation/uikit>; “iOS From Scratch With Swift: First Steps With UIKit,” Bart Jacobs, *envatotuts+*, December 16, 2015, <https://code.tutsplus.com/tutorials/ios-from-scratch-with-swift-first-steps-with-uikit--cms-25461>.

⁶⁸ “UIKit,” *Apple*, <https://developer.apple.com/documentation/uikit>; “The History of iOS, from Version 1.0 to 14.0,” Sam Costello, *Lifewire*, September 18, 2020, <https://www.lifewire.com/ios-versions-4147730>.

⁶⁹ “What is Cocoa?,” *Apple*, <https://developer.apple.com/library/archive/documentation/Cocoa/Conceptual/CocoaFundamentals/WhatIsCocoa/WhatIsCocoa.html>.

⁷⁰ “Apple’s Mac OS X to Ship on March 24,” *Apple*, January 9, 2001, <https://www.apple.com/newsroom/2001/01/09Apples-Mac-OS-X-to-SHIP-on-March-24/>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁷¹ “Create ML,” *Apple*, <https://developer.apple.com/documentation/createml>.

⁷² “Create ML,” *Apple*, <https://developer.apple.com/documentation/createml>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁷³ “About OpenGL for OS X,” *Apple*, https://developer.apple.com/library/archive/documentation/GraphicsImaging/Conceptual/OpenGL-MacProgGuide/opengl_intro/opengl_intro.html.

⁷⁴ “OpenGL,” *Fandom*, <https://apple.fandom.com/wiki/OpenGL>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

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Quartz⁷⁵ - Available from macOS 10.4 (April 29, 2005);⁷⁶ allow users to browse, edit, and save images, using slideshows and Core Image filters. APIs include Quartz Composer, ImageKit, and PDFKit.

Xcode⁷⁷ - Available from macOS 10.3 (October 24, 2003);⁷⁸ integrated development environment (IDE) for macOS, used to develop software for macOS, iOS, iPadOS, watchOS, and tvOS. Provides developers the software features that are necessary to design, develop, and debug software for use on iOS and macOS.

OTHER

FairPlay Streaming⁷⁹ - Available since 2009;⁸⁰ a digital rights management (DRM) technology that allows secure delivery of streaming media to devices through HTTP Live Streaming (HLS) protocol. Using FairPlay Streaming (FPS) technology, content providers, encoding vendors, and delivery networks can encrypt content, securely exchange keys, and protect playback on iOS, iPadOS, watchOS 7, tvOS, and macOS.

MusicKit⁸¹ - Newest iteration available as part of the iOS 15 beta (June 7, 2021) and macOS Monterey 12 beta (July 1, 2021);⁸² allows access to Apple Music account and integration of Apple Music player on applications and websites.

⁷⁵ “Quartz,” *Apple*, <https://developer.apple.com/documentation/quartz>.

⁷⁶ “Quartz,” *Apple*, <https://developer.apple.com/documentation/quartz>; “Complete list of macOS versions,” Karen Haslam, *Macworld*, December 3, 2020, <https://www.macworld.co.uk/feature/os-x-macos-versions-3662757/>.

⁷⁷ “Introducing Xcode 12,” *Apple*, <https://developer.apple.com/xcode/>; Epic Games, Inc.’s Responses and Objections to Apple Inc.’s First Set of Interrogatories, December 11, 2020, p. 15.

⁷⁸ “Xcode,” *Fandom*, <https://apple.fandom.com/wiki/Xcode>.

⁷⁹ “FairPlay Streaming,” *Apple*, <https://developer.apple.com/streaming/fps/>.

⁸⁰ “Apple® FairPlay® Streaming DRM,” *Intertrust*, <https://www.intertrust.com/products/drm-system/apple-fairplay-streaming-drm/>.

⁸¹ “MusicKit,” *Apple*, <https://developer.apple.com/documentation/MusicKit/#Overview>.

⁸² “When Will the iOS 15 Public Beta Be Released?,” Eric Slivka, *MacRumors*, <https://www.macrumors.com/guide/ios-15-public-beta-release-date/>; “Apple Releases First Public Beta of macOS 12 Monterey,” Juli Clover, *MacRumors*, July 1, 2021, <https://www.macrumors.com/2021/07/01/apple-seeds-first-macos-monterey-public-beta/>.

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